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Congenital Pigmentation of the Retina. (Burton Chance.)

THE
Practical Medicine Series

COMPRISING TEN VOLUMES ON THE YEAR'S PROGRESS
IN MEDICINE AND SURGERY

UNDER THE GENERAL EDITORIAL CHARGE OF

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VOLUME III

The Eye, Ear, Nose and Throat

EDITED BY

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PREPARATIONS

FOR THE EYE

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PREFACE.

The year 1914 has not been especially prolific of ophthalmic investigation in any particular department (unless one excepts such subjects as glaucoma and the conservation of vision), while the world war is probably responsible for the marked decrease in the output of literature on the eye and its diseases. Nevertheless there have been more than enough of interesting and important articles, monographs and other publications to supply, in review or abstract, several volumes of the Practical Medicine Series. The Editor has experienced the usual difficulties in choosing from these embarrassing riches and has been obliged to omit the good work of many contributors. In his task he has been greatly aided by permission to use the valuable abstracts made by the staff of *Ophthalmology*, headed by its indefatigable editor, Dr. H. V. Würdemann. He has also availed himself of reviews in the *Annals of Ophthalmology*, the *Zeitschrift für Augenheilkunde* and other ophthalmic journals.

The reader will find, here and there, a few remarks appended to the abstracted accounts of papers by others, which the Editor has felt called upon to make.

CASEY WOOD.

DISEASES OF THE EYE.

EXAMINATION OF THE EYE.

The Dependence of the Intra-Ocular Tension on the Quality of the Blood. Hertel¹ has shown that the intra-ocular pressure can be much influenced by alterations in the composition of the blood, irrespective of fluctuations of the blood-pressure. He describes in detail his experiments on eighty rabbits into whose jugular or auricular veins he injected solutions of varying concentrations of crystalloid and colloidal substances, recording the intra-ocular tension with the tonometer of Schioetz and the blood-pressure. The substances used were chloride, sulphate, phosphate, bicarbonate, acetate, isovalerianate, and butyrate of sodium, grape sugar, urea, water, gelatine, albumin, yellow of egg, horse serum, human serum and the blood of rabbits. In general, the effect of all substances was analogous to that of chloride of sodium; the solutions of higher percentage diminished, those of lower percentage increased, the intra-ocular pressure. The effect of these injections depended on the osmotic concentration of the solution, irrespective of the substances. The blood-pressure was not much influenced thereby, or very irregularly. The blood itself showed changes of concentration, while there was a diminution of the water content of the eye, proving that the infused solutions act directly on the eye. In the dead animal the infusion of a solution of sulphate of sodium of 10 per cent. and 0.45 per cent. increased the tension. The occurrence of edema in other parts of the body of the dead animal suggested that the vitality of the membranes which must be passed is of importance, and pointed to the endothelium of the vessels.

(1) Arch. f. Ophth., Vol. 88, p. 197, 1914.

Examination of the Eye With the Tonometer. An opinion of the value of this instrument with which the Editor is inclined to agree is that of T. Harrison Butler.² He says:

"I have used the Schiötz tonometer for the more recent cases, but up to the present the instrument has disappointed me. The readings are constantly at variance with the clinical picture and with the information afforded by digital palpation. As Wessely has pointed out, it measures two factors, either of which may vary: the intra-ocular tension and the rigidity of the cornea. The tonometer is valuable to measure the tension of one eye against its fellow; as an absolute recorder of intra-ocular tension I find it is useless—fingers serve me better. But with increasing experience I hope to get better results. I find that private patients do not object to the tonometer, and with them I have got more useful information than in the case of hospital patients."

Movable Test-Types. Moss-Blundell³ has devised a movable type, an illustration of which is shown. The type is mounted on a ribbon, which travels behind a white plate, with circular apertures. The appliance measures



Fig. 1.—Movable Test Types.

10 in. by 4 in. by 1 in., so that it can be conveniently carried in a hand-bag. It is made by Davidson and Co., Great Portland Street, London, W.

(2) Ophthalmoscope, p. 332, March, 1914.

(3) Brit. Med. Jour., July 4, 1914.

A New Electric Ophthalmoscope. Charles H. May⁴ has introduced an electric ophthalmoscope which has some original features, among them the following: (1) The customary fragile reflecting mirror is dispensed with and a solid glass cylinder employed, the lower part of which acts as a condenser, the upper part, in the form of a prism, as a reflecting surface; (2) the fundus-illuminating collection of rays presents an even circular surface and not merely the image of the lamp-filament; (3) the intensity and size of this illuminating area can readily be altered; (4) the ophthalmoscope can be attached to a battery handle or by means of cords to a small storage-battery or the street current; (5) a rheostat is attached to the instrument; (6) the illumination is automatic—that is, the current is turned on when the ophthalmoscope is grasped and automatically released when the instrument is not in use; in this manner there is no waste of current and the small battery in the handle (size 5x $\frac{3}{4}$ inches) lasts a long time; on the other hand, the current can be used continuously by altering the position of the contact spring; (7) the instrument can be used as a transilluminator; (8) finally, in case the battery gives out or the mirror burns out—and this happens at unexpected times with the best electric instruments—the disc portion of the ophthalmoscope can be separated, readily attached to another handle with a tilting mirror, and thus converted into an ordinary reflecting ophthalmoscope for use with any convenient source of illumination.

[The Editor has made experiments with the various electric ophthalmoscopes in the market, especially for the purpose of determining what form is best adapted to the examination of the eye through the undilated pupil. As is well-known, the corneal reflex is generally the main difficulty to be avoided. The examination of several thousand human and lower animal eyes under these conditions has convinced the Editor that the slit mirror—especially the metallic mirror—gives the most satisfactory results, both as to actual observation of the fundi and as to preservation of the uniformity of illumination and the reflecting surface.—ED.]

PRESERVATION OF EYE SPECIMENS.

New Methods of Preserving Macroscopic Eye Specimens in Natural Colors. Several methods are described by R. Greeff.⁸ He considers the following the simplest and best: The eye is hardened in a 5 per cent. solution of formaline for from twelve to twenty-four hours, cut, and placed for ten minutes in 70 per cent. alcohol, then in 80 per cent. alcohol, and finally for half an hour in 96 per cent. alcohol, after this in Pick's solution, which consists of distilled water 500, acetate of sodium 150, glycerine 250. The specimen is fixed to the glass by gelatine and then the glass filled with Pick's solution and the cover fastened with caoutchouc paste. Greeff's preparations show the natural colors of the tapetum and blood as well as when they were freshly preserved ten years ago.

A New Method of Preparing an Eye for Microscopic Sections is described by Hal R. Wright.⁹

The following is his description of the fixation apparatus by which intra-ocular pressure is maintained and the tissues fixed in their normal positions, thereby preventing detachment of the retina and shriveling and wrinkling of the cornea. The process requires (see Plate I):

1. Perforated cork to limit evaporation.
2. Reservoir for fixation fluid.
- 3 and 4. Perforated cork and Y tube, all well-paraffined to prevent leakage.
5. Rubber tubings.
6. Pinch-cocks to prevent fixing fluid from running out while eye is being adjusted or removed from pipette.
7. Glass pipette, resembling medicine dropper.
8. Eyes as they appear when in position.
9. Jar containing fixing fluid, same as in reservoir above.

It is important to observe in particular the following rules:

1. The eye should be as fresh as possible.
2. See that the reservoir is filled with fixing fluid to be used.

(8) Arch. f. Augenheilk., Vol. 76, p. 255.

(9) Ophth. Rec., May, 1914.

3. Open the pinch-cock and drive all the air from the pipettes.

4. Plunge a Graefe knife into the vitreous chamber 4 or 5 mm. posterior to the sclero-corneal border.

5. Insert the pipette into this opening, seeing that it fits tightly enough to support the eye while the pinch-cock is open.

6. Let the pinch-cock close on the upper end of pipette.

7. Suspend the eye in a jar or bottle containing the same fixing agent as in the reservoir above, and allow it to remain as long as desired.

This apparatus is used only to fix; after this the eye is removed, washed in running water for twelve hours, dehydrated, and infiltrated in the usual manner, excepting that during the infiltration the eye should remain in the thin and thick celloidin each, for from ten to twenty days. The writer finds that by doing this the lens, sclera and cornea cut and hold together better than by the old method.

W. N. Sharp¹ deals in a most interesting manner with the details and technique of the *mounting of ophthalmic specimens*. If one-half of the eyeball is used for mounting, and the other half for microscopic purposes, it is freed from blood and extraneous matter and placed in a 10 per cent formaldehyde solution for from twenty-four to forty-eight hours, after which it is washed in water, and placed in alcohol of 33 per cent., 40 per cent., 50 per cent., 60 per cent., 70 per cent., and 80 per cent. for twenty-four hours each, except the last, in which it may remain several days. The globe is then immersed in water to eliminate the alcohol, or until it sinks to the bottom, after which it is dried, wrapped in paraffin paper, or rubber tissue, and frozen after the manner of ice cream. It can now be sectioned with a well sharpened thin-bladed case-knife, or a plano-concave razor. The section to be used for microscopic purposes is returned to the 80 per cent. alcohol, and the section for mounting is placed in glycerine one part and water three parts for twenty-four hours, after which it is transferred to a solution of glycerine one part and water two parts for twenty-

(1) Jour. Ind. State Med. Ass'n., March 15, 1914.

four hours longer. The section is then placed in prepared gelatine which is made as follows: "Golden Label" gelatine 10 grams, water 62 c.c.

Cut the gelatine into small pieces and heat in a small mortar over a Bunsen flame, constantly stirring the solution. After the gelatine is thoroughly dissolved, add a small portion of the white of an egg, and heat again, to clarify. Filter the solution through wetted filter paper, and to the filtrates add an equal volume of glycerine. Agitate the fluid with a glass rod and add 2.50 c.c. of a 10 per cent. solution of carbolic acid. The cover of the specimen glass may be permanently cemented on with silicate of soda (liquid glass) after the glycerine jelly is hard and free from moisture.

[The reader is respectfully referred to the work of a committee appointed many years ago by the Section on Ophthalmology of the American Medical Association to investigate the best means of mounting macroscopic eye specimens. It does not appear to the Editor that much if any improvement has been made on the findings of that committee since its report was published. He would consequently suggest that laboratory investigators consult this report, entitled "*The Various Methods of Preserving and Mounting Gross Eye Preparations*," before adopting a new procedure.—Ed.]

HYGIENE OF THE EYE.

New Type of Danger Signal. *Popular Mechanics*, for February, 1914, says: A colored danger signal consisting of a blue circle placed within a yellow rim is being advocated for use in industrial plants. Although red is now almost universally used as a danger signal, it is far from satisfactory for that purpose, since of the 4 per cent. of all men who are defective in color perception the majority are unable to distinguish red. Yellow and blue are the most luminous colors of the spectrum, and a combination of these colors can be seen at a greater distance in daylight and is more easily distinguishable in poor light than any single primary color or any other combination of colors. In addition to this it has been found by experiment that this combination appears as

red or green to workmen who are unable to distinguish yellow and blue, so that a definite danger indication is given in any case.

[My colleague, C. P. Small, has made the following comments on this new form of danger signal, with which I entirely agree. The note was published in the *Journal of the American Medical Association*, January 17, 1914, and reads as follows: "On a purely scientific basis we can explain why blue and yellow would be extremely poor substitutes for green and red. Ordinary blue glass transmits many red rays besides the blue ones, leaving about 4 per cent. of the naked light behind it to pass through it; while by a glass of fairly pure blue, the luminosity would be reduced to about 2 per cent. This luminosity in foggy weather would be reduced to nothing. A yellow signal would be luminous enough, but under certain atmospheric conditions would appear too much like white. Green transmits from 10 to 20 per cent. of the luminosity of the light behind it, while red glass also allows about 10 per cent. of the light behind it to pass through. In our days of high speed, both on land and on sea, it is highly necessary to be able to see and distinguish the colors of light at a distance of several thousand feet. In certain conditions of the atmosphere, blue and yellow can not be distinguished as such at this distance, and the danger of collisions would be greatly increased if these colors were to be used as signals. The important thing to be considered is this: the main object is not to use colors which will be most easily distinguished by the comparatively small number of color-blind persons (less than 4 per cent. of the entire population) under the most favorable conditions, but to use such colors as will be most easily seen by the 96 per cent. of normal-sighted persons under the most unfavorable conditions. This matter is, in fact, only a more conclusive argument for prohibiting color-blind persons from holding any position in which a quick and accurate perception of color is an imperative necessity."—ED.]

Ophthalmia Neonatorum. Various aspects of this ever-fresh, and yet ancient, subject are discussed by W. W. Fowler.² The writer suggests that in opening the lids

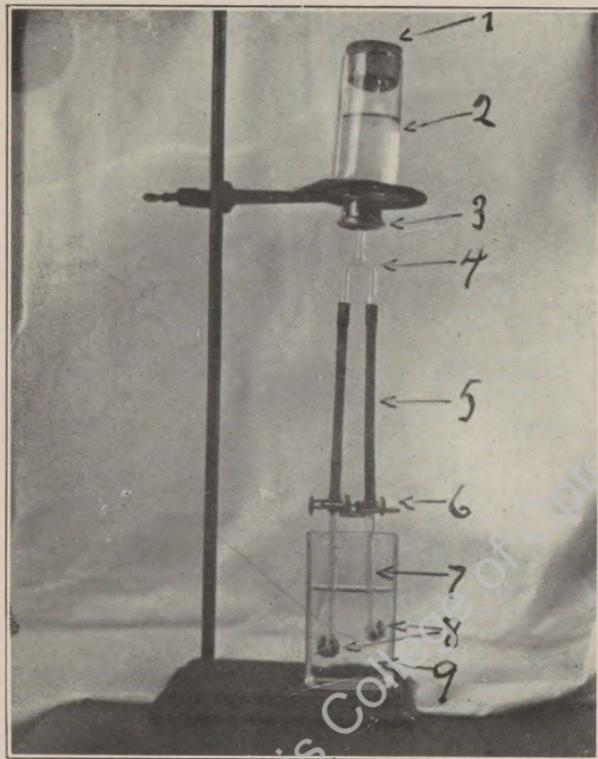
for the first time it is well to cover the palpebral fissure with a piece of absorbent cotton saturated in a solution of bichloride of mercury, which will intercept the pus as it gushes out when the lids are drawn apart, and thus prevent its spurting into the eyes of physicians or attendants. He says: "the most successful treatment consists in the instillation of a 10 per cent. solution of argyrol into the conjunctival sac every 15 minutes night and day. These frequent instillations of argyrol do not as a rule have to be kept up longer than thirty-six or forty-eight hours, by which time the intervals may be lengthened daily. In connection with the above treatment the application of the nitrate of silver should be made occasionally by the surgeon."

[The Editor regrets that he is not able to agree with the writer of the foregoing paragraph. In his opinion argyrol, in any or all of its solutions, is of no more use in ophthalmia neonatorum than any other mild antiseptic. If the surgeon really desires an antiseptic in this case there are several well-tried agents that he may choose, among them a 1 per cent., or at most a 2 per cent. solution of silver nitrate. There appears no legitimate reason why the attending physician should employ, instead of such a well-tried and dependable remedy, such practically inert agents as argyrol.—ED.]

Protective Spectacles for Glassworkers. This subject is discussed in the *Scientific American*,³ which remarks that at a recent meeting of the Royal Society Sir William Crookes described some experiments on which he has been engaged, to produce a kind of glass for use in spectacles which will cut off the extreme heat rays that are so injurious to the eyes of glassworkers in causing cataract, without obscuring too much light or materially affecting the color of objects seen through the glass. He sought also to cut off the ultra-violet rays. Although the ideal glass, which would transmit all the colors of the spectrum, but cut off the invisible rays at each end, has not been found, he has produced spectacles which transmit less than 10 per cent. of the heat rays, and none of the ultra-violet, and are sufficiently free from color for

(3) March 21, 1914.

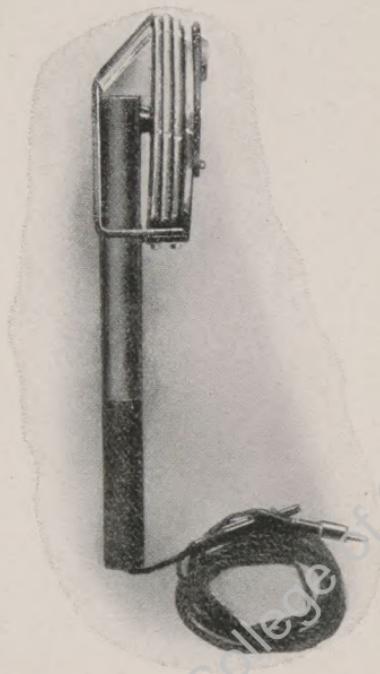
PLATE I.



Apparatus for fixing eye tissues.—Wright (see page 12).

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PLATE II.



Illuminated scotometer.—Pearson (see page 25).

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practical use. He doubts whether absolute freedom from color is desirable. After experimenting with a great number of elements he found that combinations of two or more of the following were likely to come nearest to the desired result: Cerium, chromium, cobalt, copper, iron, lead, manganese, neodymium, nickel, praseodymium, and uranium.

Occupational Traumatisms of the Eye. A lucid, comprehensive article by E. M. Shanklin⁴ points out the beneficial results following primary investigations of so-called industrial blindness, and the work of committees, appointed from the American Medical Association and the various state medical societies, for the conservation of vision. Statistics from nine plants of the American Steel Foundries Co. show a reduction of 80 per cent. in the number of eye injuries, in less than three years. Six months after the inauguration of goggles for the protection of eyes, forty-eight pairs with one or both lenses broken, due to flying particles of steel, etc., were returned from one plant alone. From the nine plants of this company, in a like period, 287 pairs met with similar damage. It is noteworthy that during the past twenty-seven months but three men have lost an eye while at work in these plants, only one of whom was wearing his goggles at the time of the accident. The author's investigations have led him to the following conclusions: The safety first movement is successful in so far as related to eye injuries, at least. The large employers of labor are giving more and more attention to the physical care of their employes. There should be coöperation between oculists and the men in charge of safety departments. Publicity be given the fact that even slight injuries of the eye may prove serious, and should have immediate and competent attention. The "storeroom expert" is a menace to the eyesight of the workmen he attempts to treat. Likewise the handy man in the mill. Eye surgeons should be regularly appointed by all the larger mills and factories, and in the railroad centers.

Workmen's Compensation in Great Britain. So far

(4) *Jour. Ind. State Med. Ass'n.*, April 15, 1914.

as this pertains to ophthalmic cases, J. Gray Glegg⁵ has reported 136 cases having a medico-legal bearing, which he classifies as follows:

Miner's nystagmus	13
Conjunctivitis traumatica	2
Nebulæ and leucomata of the cornea	27
Injuries to the cornea, iris and lens, with some useful vision	16
Aphakia	9
Dislocation of the lens	1
Sympathetic disease	1
Secondary glaucoma	1
Foreign body in the globe, with good vision	2
Rupture of the choroid	1
Rupture of the optic nerve	2
Blind eyes, from uveitis, etc.	17
Operative anophthalmos	11
Diplopia	2
Rupture of the nasal duct	1
Arteriovenous aneurysm of the orbit	1
Cerebral concussion	1
Anthrax of the neck	1
Non-traumatic	27

Advantage is occasionally taken of the presence of (miner's) nystagmus to have a rest from duties at half pay, and it is not unknown for a man suffering from the disease to apply for compensation, and after a time to arrange with the colliery company to accept a lump sum instead of weekly payments, and then migrate to some other colliery district, start work, and probably play the same trick again.

If nystagmus is present or can be elicited by tests, the author recommends work above ground for at least three months, after which time the men are re-examined. If after twelve months no evidence of nystagmus is present, he advises a return below ground with qualifications as to kind of work. As a matter of prophylaxis against nystagmus better lighting of mines is recommended.

In the author's opinion there are a large proportion of cases in which a claim has been made for the accident alleged, or otherwise, which have nothing to do with defective conditions of the organ. After eliminating the cases of nystagmus there are reported twenty-seven cases as non-traumatic, as follows:

Conjunctivitis	1
Trichiasis	1
Ulcer of the cornea	1
Keratitis	1
Keratitis diffusa	1
Kerato-iritis	1
Irido-cyclitis	3
Cataracts	1
Glaucoma	6
Choroiditis	2
Amblyopia ex anopsia	2
Myopia	2
Hypermetropia	2
Sarcoma of the choroid	1
Tobacco amblyopia	1
	2

One is not justified in considering that all workmen who make a claim for compensation for defective sight—the result of disease—are dishonest for, undoubtedly, in many cases an insignificant accident calls the attention of the man to a defect which has long been present, but of which he has been unaware. Examples of attempted fraud are given, after which it is stated that it would appear that in English courts a workman claiming compensation can make the most exaggerated claims, can practice the most glaring malingering, and be proved to be an arrant liar, and yet need fear no punishment if his case is shown to be a bogus one.

Mention is made of the difficulty of conveying to the lay mind of the legal profession the actual degree of loss of utility in a damaged eye, for in many occupations the absolute utility of an eye possessing 6/12 vision is as great as if it were 6/6.

The author states, in making out his reports, that the acuteness of vision in an aphakic eye (the other being normal) can not be utilized, and although the vision with the strong plus glass on is good, for practical use, the eye only serves to enable the workman to avoid large objects on the same side—therefore a workman with one aphakic eye is equally efficient whether the vision of the aphakic eye with correction is 6/6 or 6/60. In those cases in which the vision has been entirely lost, or the eye enucleated, it will depend on the type of work done as to whether the loss of binocular vision is an important point. Each case will, therefore, have to be considered

on its own particular merits. Among other points, the author thinks it would be better if the medical examiner were able to express his opinion of the usefulness of an organ in percentages of utility rather than central visual acuity.

The Hygiene of Reading and Near Vision. A most instructive paper with this title was read at the 1914 meeting of the British Medical Association by John Herbert Parsons,⁷ who traced the development of letters from the earliest times, and showed how various modifications in letters had arisen, and that the latter were due either to a desire to facilitate the ease of reading or for the purpose of beautifying the print. It is only, he said, within the last thirty years that the subject has been studied from the scientific point of view. At first letters were introduced with but little consideration of physiologic requirements, but more largely with regard to the mechanism of their production. The writer described the way in which most of the Roman letters were made up and developed. Adolph Weber investigated the rapidity of reading with types of different sizes, and found that if letters were more than 2 mm. in height the rate of reading diminished, and the best height was 0.20 mm. He then discussed the effect of interlineation, and the distance between letters and words and letters. The tendency of modern books was to reduce the length of lines. Cohn gave 90 mm. as the ideal length, 100 mm. as the maximum, and 30 mm. as the minimum. Williamson, of Manchester, found that of 250 school books the type was equal to a larger than Cohn's standard in 109. In 111, or 44 per cent., the type was too small. He also drew attention to the relationship of illumination to near work. Roughly speaking, the minimum illumination of the type which permitted of normal visual acuity with Snellen's test types was between 2 and 3 meter candles. Vision improved up to 10 meter candles, after which it remained almost constant up to 30 meter candles and over. A glare had less effect in diminishing visual acuity than is generally supposed to be the case, but there was no doubt that it was distressing and should be avoided. A committee of the Society of Illuminating Engineers

had reported that the minimum illumination measured at any desk should not fall below 2-foot candles, but for special work, such as drawing, sewing, etc., as much as 4-foot candles were desirable. For assembly rooms and general illumination a minimum of 5-foot candle was recommended, or a horizontal plane of 3 ft. 3 in. from the ground level.

What Is the Best Illuminant for the Eyes? Some of the preliminary announcements (1914) of the committee of the American Medical Association to study the effect of different lighting systems on the eye are announced. Among the aspects of lighting that have definite relations to the eye are: (1) evenness of illumination; (2) the angle at which the light falls on the object viewed; (3) the diffuseness of the light; (4) the evenness of surface brightness; (5) the intensity of the illumination; and (6) the quality of light. The first four of these factors have been found by means of experimentation to be closely connected, although not absolutely uniform in their variation. Daylight has been found to be the most satisfactory form of illumination, from the point of view of distribution. Of the systems of artificial illumination, the so-called indirect is the best. A system called the "semi-direct" was found to be little better for the eye than the direct system. In this the light is thrown to the ceiling or walls, as in the indirect system; but part of the light is allowed to come through translucent shades. The relation of the different systems of lighting to the diminishing efficiency of the eyes was brought out in a series of experiments in which daylight was shown to be almost without effect on the eyes after three or four hours of work; under direct artificial illumination the eye loses working power at a very rapid rate, and almost as rapidly with the semi-direct illumination. The indirect illumination was found nearly as harmless as the daylight. Sharpness of vision was also found to be highest, for any given degree of illumination, under daylight, and poorest under direct artificial lighting. The deteriorating effect of the light on the efficiency of the eye seems to be due to the fatigue of the muscles, rather than to any action on the retina. Both the muscles of accommodation and of fixation seem to be

affected. The explanation of the fatiguing effect of direct illumination is given by Dr. C. E. Ferree as follows:

1. The images of the bright spots near the margin of the retina arouse a reflex tendency to fix them instead of the objects held in the center of attention.

2. The bright spots in the field of vision, but not in focus, arouse an unconscious reflex tendency to focus on them, so that there is constant variation in the accommodation of the eyes.

3. The bright spots fall on portions of the retina that are not adapted to them, cause discomfort and lead to spasmoid contractions of the muscles, which disturb the clearness of the image and add greatly to the fatigue. The result of these factors working together is excessive eye-strain, which shows itself in a loss of power to do work.

The intensity and the quality of the light are also of great importance. For daylight and the indirect system, a wide range of illumination allows the eye to continue at work several hours without undue strain, or rather without considerable falling off in efficiency. But with the semi-direct and the direct system there is evidence of fatigue at every intensity of illumination.

Eye Diseases Among the Indians of Alaska. Emil Krulish⁹ has given information regarding our Alaskan Indians, with reference to disease and sanitary problems, that is almost entirely in consonance with reports of recent years. Aside from general diseases and conditions, some 2.8 per cent. of Krulish's examinations discovered eye diseases (trachoma, pterygium, conjunctivitis are common); there are 13 per cent. of such sufferers. Twenty per cent. of trachomatous are blinded; the form Krulish has come upon he believes to be contagious. In segregated families, the parents are usually completely or partially blind, the older children show advanced scleral changes, while the younger children evidence recent infection. Well-advanced cataracts in natives 35 years old were not uncommon. Most such eye afflictions could be prevented. Throat diseases (adenoids and enlarged tonsils), predisposing to tuberculosis, diphtheria,

and other infections, impairing hearing, retarding psychic development, and resulting in buccal deformities, were found in one-fifth of the Indians under 18 years of age.

Here, as elsewhere, the diseases visited on poor Lo by civilization are reacting on the civilizers—a consideration that should be weighty where others would not appeal. Our Alaska Indians trade in the same stores with the palefaces; work in the same mines and canneries; the races intermingle freely in public places. They are neither so sardonic nor so malevolent as the cinema and the fictionists would have us believe; by hundreds they gather for feasts, dances and other ceremonials. Thus is the Indian an untoward factor in the communal health.

A Self-Recording Device for Testing the Color Sense. This is a practical and interesting scheme that can be recommended to ophthalmologists generally. As Jennings¹ truly says, for many years the Holmgren colored worsteds have been used by the railways and marine service of the United States and most foreign countries to test the color sense of employes. When properly used, according to directions, this test has proved to be practicable and reliable. The most serious objections to it are:

1. The worsteds become soiled by constant handling so that the more delicate shades can hardly be distinguished one from the other.

2. The method of recording the skeins selected by the candidate is crude, laborious and liable to lead to error.

In order to overcome these objections he has constructed a test in which the worsteds are not handled and the candidate makes a permanent record of his own color sense. It consists of a square box divided into an upper and a lower half, each half having a lid—virtually two shallow boxes with bottoms joined together. The upper side of the box is marked "Test No. 1 Green," and contains a color board made up of all the different colors, shades and tints likely to be mistaken by the color-blind for green. The lower side of the box is marked "Test No. 2 Rose," and contains a color board made up of all the different colors likely to be mistaken by the color-

(1) *Jour. Amer. Med. Ass'n.*, Sept. 19, 1914.

blind for rose. The color boards, like the box, are absolutely square and each contains sixty-four patches of worsteds of various colors and shades, making a total of 128 colors used in the test.

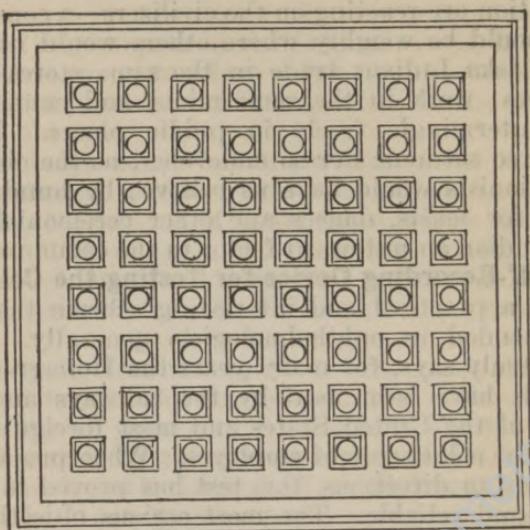


Fig. 2.—Jennings' self-recording color test.

In each patch of colored worsted is a circular opening in the color board which is for the purpose of registering the particular patch of color chosen by the candidate. This he does by inserting a pointed pencil of wood or metal through the opening and punching a hole in the record sheet which had previously been placed beneath the color board. The position of the patches of color and the circular openings have been arranged in an absolutely symmetrical design, so that when the box is turned in any one of four positions the same appearance is presented and it is impossible to say which is top or which is bottom. The openings of the color boards are so arranged that the records of both the green and rose tests are made on a single sheet.

The cover marked No. 1 is removed, the color board lifted out, a record blank inserted and the color board replaced. Care must be taken to see that the mark "top"

in the box, "top" on the back of the color board and the top of the record blank all correspond. The box is now turned around several times until all sense of direction is lost.

The green test skein fastened to the inside of the box cover is placed at a distance of 2 feet and the candidate is given the pointed pencil and requested to look along each row of colored patches and when he sees the test color or one of its lighter or darker shades, he is to place the point of the pencil in the opening and punch a hole in the paper beneath. Having completed Test 1, the cover is replaced and the box turned over, exposing Test 2, the rose. The record blank having been inserted and the rose skein displayed, the test proceeds as before.

According to the writer the chief advantages of the scheme are:

1. The candidate makes a permanent record of his own color sense.
2. The soiling of the worsteds by constant handling is avoided.

Illuminated Scotometer Capable of Being Used for Railway Color Test. The following is a brief description of an instrument designed by John Pearson² which he has found useful both as a scotometer and for testing color vision. One of its advantages is its portability, for it can be carried in the coat pocket. The accompanying illustration gives a general idea of the instrument. It consists of four circular superimposed discs, each having a number of apertures. Two of these discs are each fitted with glasses of the following colors: violet, minus red, signal green, orange, red, and white. This duplicating allows of the mixing of these colors. A third disc is fitted with neutrals of various shades and with ground and corrugated glass after the manner of Edridge Green's color lantern, to represent atmospheric conditions. The fourth disc has diaphragms varying in size from 0.5 mm. to 13 mm. The illuminant is a small electric incandescent lamp fitted in the handle, the light from which is reflected by means of a mirror, so as to pass through the uppermost opening A + 10 D. Sph. lens in front of this renders these rays approximately parallel.

(2) Ophthalmoscope, July, 1914.

By means of letters engraved on the discs the required colors and neutrals are easily placed in position and retained accurately by spring clips. Those possessing a battery-in-handle electric ophthalmoscope can readily adapt the battery and lamp to this instrument, which has been made for the inventor by Mr. John Trotter, 40 Gordon Street, Glasgow, Scotland. (See Plate II.)

REFRACTION AND ACCOMMODATION.

Why Can Not Anisometropes of High Degree as a Rule Tolerate Fully Correcting Glasses. Ishihara³ has tried to answer this question by experimentally rendering himself, an emmetrope, anisometric by means of contact glasses of various strengths, placed before one eye, and then wearing the correcting glasses, with the following results: 1. In fully corrected anisometropia a difference in the size of the retinal images (given by Donders as the cause of the intolerance), was not noticeable. 2. Anisometropes can see and read without distress through the central parts of the glasses. 3. A disturbing diplopia is induced if the anisometrope looks obliquely through the marginal parts of the correcting lenses, which may set up a muscular asthenopia due to the unusual innervation necessary for the fusion of the double images. 4. The ocular muscles become accustomed to rotate one eye more or less to all sides according to the changed direction of the chief rays, more readily than the other eye. This latter observation follows from the fact that, after removing the spectacles, peculiar double images occurred which could be fused with difficulty (on account of absence of binocular vision) and had such a position that they could be eliminated by replacing the spectacles. It is a well-known fact that the marginal parts of ordinary lenses act like prisms and deflect rays impinging obliquely. With regard to toleration of lenses the individual differences of sensitiveness, the mode of using the eyes and lenses and, above all, the presence or absence of binocular vision must be considered.

The Operative Treatment of High Myopia. W. E. Lambert⁴ gives a history of seven patients on whom he operated for high myopia. In all the patients both eyes were operated on, and he considers that his results were such as to controvert the opinion that an operation should not be performed on the second eye. In three patients of 31, 50 and 58 years of age, cataracts had begun to form and in two of them, lenticular opacities had developed so as to justify extraction on that account alone. In only three patients, in whom the ages were 16, 27 and 8 years respectively, were the conditions such as are generally considered to justify operation; that is, the patients were under the age limit, and had no vitreous opacities and no choroidal changes. In one of the latter, age 27, occurred the only complication which might have been attributed to the operation. Six months after extraction, a central choroiditis appeared, causing decided loss of vision, which was regained later. This patient had a mild form of hyperthyroidism and to Lambert it seemed reasonable to consider that this may have been a factor in producing the choroiditis. Two of these patients have been under observation for seven years, during which time no complications have arisen and good vision has been maintained.

Lambert advises the use of the Fukala method for extraction in young subjects, while in older patients in whom lenticular changes have begun he thinks it best to make a preliminary iridectomy, followed by a preliminary capsulotomy and extraction. He advocates great care lest in needling the operator puncture the posterior capsule. Above all, he advises keeping the patient under the closest observation in order that any complication may be dealt with promptly.

New Cataract Glasses. The following description of the construction of a cataract lens of + 12 D. for distance with a + 2 D. added as a bifocal for reading, is given by J. Herbert Claiborne.⁵

Select a toric kriptok blank, grind outside curve + 6 D. and the inside curve — 6 D. and grind it thin so that it will not be more than 1 mm. thick. The result now

(4) New York State Jour. of Med., February, 1914.

(5) Ann. Ophthal., January, 1914.

is a plano above and a + 2 reading below. This lens is now cut to size, say 40x31 mm. A biconvex lens is now ground with a + 6 D. curve on each side. This is made round and 25 mm. in diameter and with knife edge. This lens is plastered to the concave side of the basic lens, their lower edges coinciding. Thus a lens results of + 12 D. for distance and + 14 D. for the near. This lens only weighs about half as much as the regulation lens, and is not at all disfiguring to the patient.

Patents on Bifocal Lenses and History of Colored Lenses. An interesting account of these matters is furnished by E. E. Shreiner.⁸ He records patent No. 59,995, November 27, 1866, Samuel Gregg, Boston, Mass.; patent No. 6,369, April 17, 1849, Hotchkiss & Norton, Syracuse, N. Y.; patent No. 1,130, April 20, 1839, C. H. C. Jachan, New York, N. Y.; patent No. 9,422x, February 20, 1836, I. Schnaitman, Philadelphia, Pa.

The patent office revised the method of numbering patents after the Schnaitman patent, which accounts for the higher number on that patent. The Schnaitman patent is on the ground or solid bifocal, the Jachan's patent is on the cement bifocal. The name Jachan is an error; it should be Dr. Charles H. L. Jackson, an oculist who lived at that time.

All told from 1836 to date, the United States has issued forty-seven patents on bifocals, divided between thirteen states, Pennsylvania leading with twelve; New York, four; Massachusetts, eight; Illinois, four; Missouri, six, and the balance scattered.

Shreiner also gives a "Short History of Colored Glass and Lenses from 1561 to 1913."

Green, 1561.—The first colored glass, used for the preservation of the human eye, of which any authentic record exists, dates back to 1561, when Jarius Aucott, a small spectacle dealer of Lisle Street, County of Middlesex, England, made a public announcement as follows: "The construction and making of spectacles with green glass, which I conceive, are of great publick utility and benefit."

Blue, 1672.—Just 111 years later we find on record that lenses were being made from blue glass, which at that

time was thought to be quite superior to green; Richard Pierson sold blue lenses at his "spectacle shoppe," in Fleet Street, London, at the sign of the "Acorn." It was the custom then and for many years later to designate all business houses with some emblem.

Smoke, 1767.—It required almost a century more before a new color was introduced to "ye publick." What is now known as smoked glass, was at this time called gray, for as such George Adams, optician, advertised them. His store being known by the sign of the "Globe." This building stood at what is now No. 60 Fleet Street, London.

The first record of colored lenses being sold in America is in the advertisement of James Peters, a manufacturer of gold and silver spectacles, on Fourth Street, Philadelphia, who calls attention to "white, blue, green and gray glasses to suit all eyes."

At what date the present term "smoke" was first used Shreiner is unable to discover.

Amber, 1832.—To Messrs. George & Elias Solomons, opticians, of Bedford Square, Parish of Stephany, England, we owe the introduction and use of amber glasses; King Henry IV granted to them a royal patent giving them the sole right to make and sell amber lenses.

Electric, 1873.—The first suggestion of a glass or lens, of a dense color and to be composed of a plate each of dark blue and dark smoke glass was at this date advocated by the celebrated optician, Charles Chevalier, of Paris, France.

Chlorophylle, 1880.—The demand for a glass that would absorb or retard the ultra-violet rays was first undertaken by Fieuzel, of Paris, who unfortunately died prior to its final completion, the work was, however, brought to a successful finish by his pupil, Leon Fargier, of the same city. *Chloros*, green, and *Phyllis*, a leaf.

Amethyst, 1885.—About this time Dr. William Thompson, of Philadelphia, Pa., first suggested the use of amethyst glass in cases of asthenopia. At this date optical glass of this color was almost unknown and the opticians secured raw material from old window panes—glass that was originally white but had turned a beautiful amethyst tint by long exposure to strong sunlight.

Arundel, 1872.—Prior to this, about 1872, Messrs. T. A. Willson & Co., of Reading, Pa., made and sold "arundel" lenses, but they were of a pink color and not a true amethyst.

Sir William Herschell, the noted astronomer, speaks of violet glass as being peculiarly transparent to violet and ultra-violet rays.

Uranium, 1900.—A yellow glass of a strong floourescent cast, occasionally used for lenses.

Hallauer, 1905.—A smoky-green glass, the invention of Dr. Otto Hallauer, of Basel, Switzerland, and said by some authorities to be superior to the yellow-green chlorophylle, as it absorbs more of the *X*- and *Y*-rays.

Enixanthos, 1906.—The yellow-smoky glass manufactured in Germany, a glass very similar to Dr. Hallauer's. *En*, in; and *Xanthos*, yellow.

Euphos, 1907.—The celebrated greenish-yellow glass of Drs. Shanz & Stockhausen, of Dresden, Germany, formerly made in six shades, but at present in only two shades as adopted by the German government. *Eu*, well; and *Phos*, light.

Roentgen, 1908.—A clear colorless glass, the invention of Prof. William Roentgen, of Germany.

Didymum, 1909.—A new glass having a peculiar salmon-pink reflection, yet at first sight one would call it a slate color, the name and color of which is derived from the salts of the metal didymum, made in Germany.

Erbium and Yttrium, 1910.—These glasses are comparatively new to the optical trade and so little information being available at this time, it is impossible to give a more extended notice. They are almost colorless but show the vertical absorption bands characteristic of the respective metals from which they derive their names.

Radium, 1911.—Also a new product by an Italian scientist, this glass is colorless, its chief claim is that it is best for high cases of myopia, a lens of — 14.00 or — 16.00 giving the same results as a — 20.00, and increasing the visual field by about 25 per cent.

Coywell Flint, 1913.—A new special flint glass from which strong lenses of all kinds may be made extremely thin, a +8, curve giving a +12 effect on regular tools. Very desirable for cataract lenses.

After-Management of Patients for Whom Lenses Have Been Prescribed. Sensible and practical is an article on this important topic by Mark Stevenson.⁷ The writer thinks it is of great importance to prepare a patient for the many surprises, difficulties and disappointments often to be experienced before securing the best results from wearing lenses. He thinks physicians make too little use of printed suggestions and explanations to their patients. At the first visit to his office, whether a cycloplegic is prescribed or lenses are to be given for a presbyope, a printed pamphlet is given to each patient. The writer's name is not placed on it, but in order to authorize it, his street address only. This pamphlet tells the patient how to secure best results through correct position of the lenses; explains the early blurring of vision in becoming used to them; explains the difficulty in adjustment, and other practical points. Another pamphlet is prepared for myopic or highly astigmatic persons and those who have had much difficulty in securing suitable lenses or who have special need of instruction in the use of their eyes. Patients who cannot see well at the distance with their nearly full correcting lenses, especially if the blurring persists for a long time, are given a very weak solution of some cycloplegic, *e. g.*, atropine or homatropine, .01 per cent. They are instructed to use just enough of the drops to clear the distant vision but not to blur to any appreciable degree the near vision.

DISEASES OF THE EYELIDS.

Chalazion and Inflammatory Tumor of the Lids. From anatomic, etiologic, and experimental researches Lowenstein⁸ believes that, anatomically, two groups of chalazion may be distinguished: (a) very cellular chalazion, mainly consisting of accumulations of plasmacytes with abundant vessels and infiltrations, and (b) chalazion with dense polynuclear connective tissue and less cellular infiltration. At the center of the infiltrations cavernae are frequently formed, probably due to the dissolving influence of the predominating leukocytes with

(7) Ohio State Med. Jour., September, 1914.

(8) Ann. f. Ophthal., p. 391, 1914.

polymorphous nuclei. The writer also observed formation of clefts with drops not soluble in alcohol and ether; many drops and globules stained red by sudan and scarlet; Russel's bodies were found in several chalazia. A large tumor of the second type grew after enucleation of a chalazion; its growth being attributed to a keloid hyperplasia of the connective tissue. No tuberculous deposits were found in animal experiments or with Much's granula or antiformine methods. In a tuberculous child the chalazion reacted to each injection of tuberculin, with swelling and pain. No tubercle bacilli were found in the excised tissues.

Carcinoma of the Meibomian Glands. A carcinoma of the Meibomian glands of the left lower lid of a woman, aged 63, which had the aspect of a large chalazion is described by Scheerer.⁹ It was extirpated with the lid, and this was replaced by a plastic operation from the auricular cartilage after the plan of Büdinger. The chief seat of the tumor is uniformly the tarsus; the lid is sagittally thickened, the skin intact and certainly not the starting point of the tumor. In one case Axenfeld made the diagnosis of probable tumor from the peculiar atrophy of the skin of the ciliary margin and the cilia, because the atrophic skin was adherent to the thickened tarsus, because the whole ciliary edge was peculiarly broadened, and because the thickening seemed to affect the convex margin of the tarsus so that eversion of the whole lid was difficult. The consistency of these malignant neoplasms is in general tough, even hard as cartilage, although soft tumors have been described. In Scheerer's case the capsule of the tumor was more or less lacking. The prognosis must, of course, be guarded. Any tumor of the Meibomian glands has a tendency to spread and must be treated radically by operation.

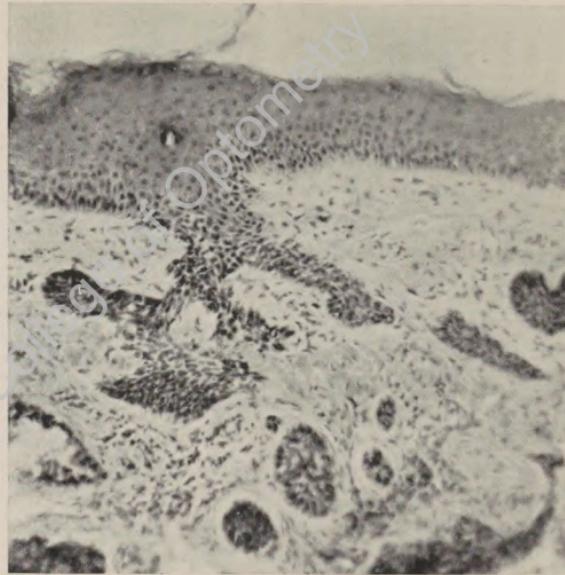
Epithelioma of the Lids. As has been pointed out by Carl Fisher,¹ from the Mayo clinic, epitheliomas of the lids require some consideration apart from epitheliomas of the skin elsewhere, because of their proximity to the orbit and sinuses and because of the disastrous effects of destruction of the lids on vision and on the appearance of

(9) Klin. Monatsbl. f. Augenheilk., p. 86, 1914.

(1) Jour. Amer. Med. Ass'n., Aug. 29, 1914.



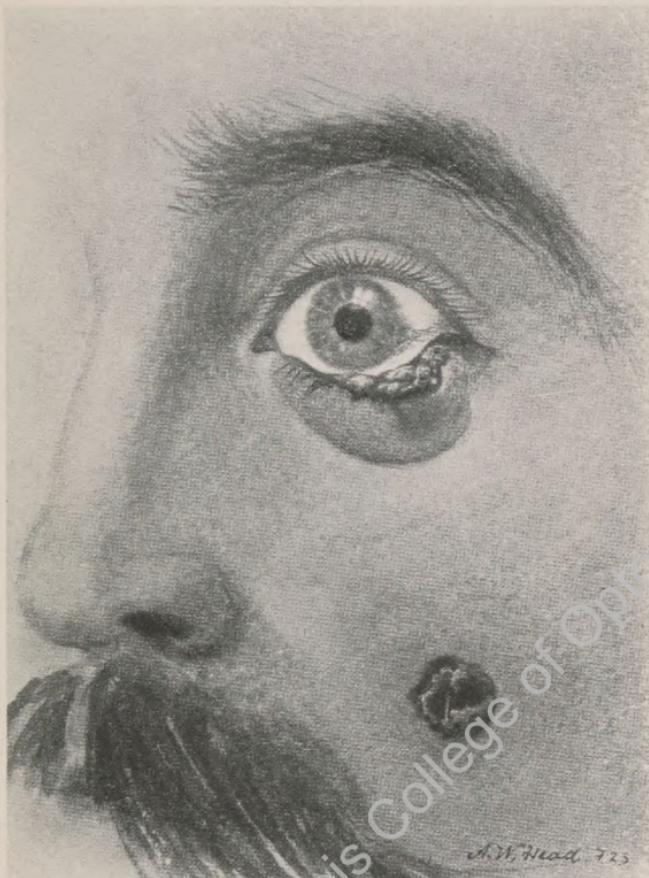
a. Epithelial down-growth showing spindle and oval cells which, when in masses, often look like sarcoma cells.—Fisher (see page 32).



b. Same as a, except growth is taken from nose.

Digitized by Illinois College of Optometry

PLATE IV.



A case of tubercular iodism simulating gumma of the eyelid.--
Stephenson (see page 34).

Digitized by Illinois College of Optometry

the patient. A good proportion of these patients do not consult the ophthalmologist but are sent to the general surgeon after a long course of salves, pastes and Roentgen-ray treatment.

He has been able to study eighty-eight cases of epithelioma primary in the lids and canthi, or involving them from the skin in the immediate vicinity (nose, cheek, brow), having chiefly in mind the prognosis of operative treatment.

The epitheliomas of the lid all belonged to the type known as basal-celled, or, to use a rather popular term, rodent ulcer. By this is commonly meant clinically a cancer of the skin of very slow growth, with no tendency to glandular metastases, spreading by continuity, and usually ulcerating as it progresses. Pathologically, it is somewhat more difficult to define, though this is perhaps of no great consequence to our present object.

After the growth has progressed, both basal and squamous cells are to be found in the field, one or the other predominating. Sometimes the appearance may closely simulate sarcoma from the tendency of the epithelial cells to assume spindle forms. (See Plate III.)

In the series of eight cases just referred to, the average age of incidence was 53 years. The youngest patient was 24 years old. The average patient waited five years before coming for treatment; many of them from fifteen to twenty-five years; these latter cases mostly began as keratoses and small wart-like nodules. Some developed rapidly, that is, in one month.

The favorite points of origin were the lower lid (46 per cent.), the inner canthus, over the lachrymal sac (36 per cent.). The next most common point of origin was the upper lid and, least common, the outer canthus.

Of the cancers of the lid, considerably over half originated in the skin of the lid just away from the cilia, the others starting indifferently on the very margin of the lid or the base. There seems to be no obvious reason why the lids should be so favorable a site for the development of epithelioma. The fact that the lower lid and inner canthus are so much more commonly affected might be attributed to the irritation caused by tears and foreign matter. Certainly these regions are usually

hyperemic when the upper lid and outer canthus show comparatively little evidence of irritation. In only one case was the pressure from eye-glasses a probable source of the initial irritation, which is so commonly looked for. The type of skin well recognized as a fertile soil for epithelioma—a dry, rubicund skin, seen most often in blond people exposed to the elements—was very often seen, but by no means predominated.

The majority of these cancers progressed by invasion only, the first step being attachment to the periosteum of the orbital border, then progression into the orbit and conjunctiva. In several cases the inner orbital walls were destroyed. Occasionally the antrum was involved, and more often the ethmoids, rendering successful operation very difficult.

Tubercular Iodism Simulating Gumma of the Eyelid.

An interesting growth presenting diagnostic difficulties is reported by Sydney Stephenson.² George W., aged 30, gave the following history: gonorrhea in November, 1906, lasting until March, 1907, that is to say, longer than any other gonorrhea from which the patient has suffered. Toward the middle of March, 1907, a spot came out on the right knee, and was followed by others on the forehead, right forearm, left upper arm and, toward the end of that month, by "sores" on the legs. In June or July last the patient's throat became ulcerated.

On August 14, a diagnosis was made of tertiary syphilis. When the writer saw the patient on Dec. 4, 1907, his condition was as follows: The outer half of the left lower eyelid was red and swollen but not tender. At first sight, the appearances reminded one of an abscess in the substance of the eyelid. On palpation, however, it was obvious that the tissues of the lid were infiltrated, and the condition recalled a gummatous process. Another infiltrated area was present in the substance of the left cheek, one inch or so above the upper lip. Below the left jaw was a carbuncular looking mass, discharging pus by several fistulas. The right ear showed a sealy eruption, not unlike eczema. On the back of the scalp, situated over the occipital bone, was a crusted sore. A number of pigmented, supple, superficial cicatrices, pos-

(2) *Ophthalmoscope*, p. 406, July, 1914.

sibly the remains of cutaneous gummata, present over right knee, both legs, left thigh, left buttock, and right forearm. (See Plate IV.)

The infiltrated lesions of the lower lid, cheek, etc., closely resemble gummata, but it became quite clear that they represented that rare form of iodism known as "tubercular iodism." This seems plain from the notes of Dr. Walsh who had previously attended him: The patient was treated locally with ammoniated mercury ointment and internally with potassium iodide (grs. 10) and citrate of iron and ammonia (grs. 10) thrice a day. His attendances at the hospital were somewhat irregular, having been registered on the following dates: August 28, September 25, October 19, and November 16. On the last-named date the potassium iodide was discontinued owing to the existence of "*well-marked iodide papules on the face, etc.*"

The patient stated that a small swelling, an "iodic papule," had existed toward the center of the left lower eyelid for about a fortnight, and that the swelling had become greater during the three days before he consulted Stephenson.

Boric lotion and oleate of mercury (10 per cent.) were applied to the affected lid. The further progress of the case is as follows: "The left lower eyelid is now tender, and the disease process has extended to the whole of that structure. There is definite ulceration of the upper aspect of the outer end of the swollen lid."

Later: "The outer half of the left lower lid is now ulcerated, and the rest of the lid is infiltrated. The parts are tender. The likeness to a gumma becomes more and more pronounced. Sajodin, one grammie twice a day, administered internally, and the ulcerated surface to be treated with iodoform."

Still later: The condition, as shown in the sketch, has improved. The left lower lid is occupied by a reddish swelling, more marked in the outer half than elsewhere, and the parts are slightly tender. A shallow ulcer, with clean-cut non-indurated edges and nodular floor, occupies the upper part of the outer half of the affected eyelid. It measures 3 cm. by 1 cm. The other sores, one on the

left cheek and the other below the left side of the chin, are also in process of healing.

In a month's time the ulceration of the left lower lid had almost healed, and the infiltration of the parts was much less marked. The other lesions were also doing well.

Finally, the ulceration of the lower lid healed, but there still remained some reddening and thickening of the outer half or two-thirds, with a few scales of desquamating skin at the lower part of the thickened area.

Of the various skin lesions that may on occasion follow the internal administration of potassium iodide, that described in the present communication is probably the rarest. At one stage the resemblance to gumma was most misleading. The writer finds the following remarks on the subject in the fourth edition of Dr. Norman Walker's "Introduction to Dermatology" (p. 69).

"In rare cases the lesions produced are at first solid, and later break down in a manner so similar to the gumma, that one or two patients have been dosed into their graves by the pushing of the very drug which was the original cause of their trouble. In others, large solid tumors have developed, leading to the mistaken diagnosis of malignant disease or even leprosy."

In reference to the present case a couple of points appear to be worthy of notice: First, that the potassium iodide had been discontinued eighteen days before the patient was first seen by Stephenson; and, secondly, that the several lesions healed under the administration of another iodine compound, namely, sajodin.

Treatment of Entropion by Grafting Lip-Membrane Into Inner Surface of Tarsus. Harold Gifford³ again describes this procedure which he first published in the January, 1892, number of the *American Journal of Ophthalmology*. He writes à propos of W. O. Maher's article in the April number of the *Ophthalmoscope*, in which that author again recommends the operation first described by him in 1897.

Even before 1892, Noisewski had advocated the grafting of lip membrane into the under side of the lid, but

(3) *Ophthalmoscope*, p. 698, December, 1914.

this was for the cure of inveterate trachoma, not for entropion. The trachomatous parts of the tarsus are scraped or cut away and membrane put in its place. Gifford has tried it in a few cases, and can testify to its effectiveness, when extirpation of the tarsus is not desirable.

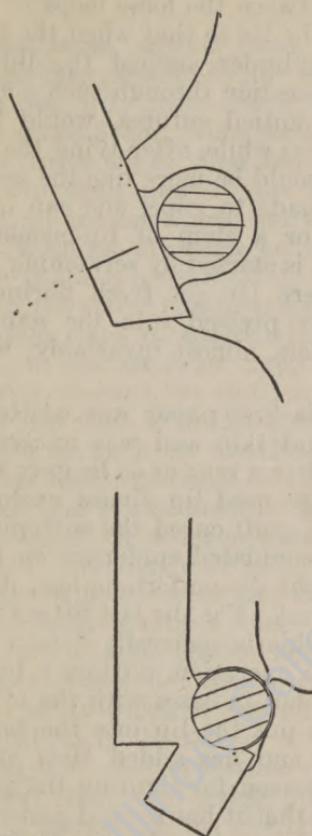


Fig. 3.—Lip-membrane grafting.

The technique consists in making an incision through the tarsus from the inner surface, about 3 mm. from the free margin. This cut is made to gape by inserting three sutures as follows: the needle is passed through the outer

edge of the free margin of the lid, taking a bite rather more than 1/16th inch wide, then it is passed through a small fold of the lid-skin about 3/16ths inch farther away from the lid-edge. Before the threads are tied, a bit of wet cotton is rolled into a hard cylinder about 3 cm. long and 5 mm. in diameter. (See Fig. 3.) This is slipped between the loose loops of thread and the outer surface of the lid so that when the threads are tied they press the cylinder against the lid and evert its margin. A cross-section through such a cylinder and lid near one of the untied sutures, would look something like the first figure; while, after tying the thread tightly, the appearance would be more like the second. Into the tarsal cut thus made to gape, one can introduce either a Thiersch flap or a strip of lip-membrane, and if a little hemorrhage is started by scratching the sides of the cut here and there (to get fresh fibrinogen), and the graft is carefully pressed into the gap with a moist instrument, it heals, almost invariably, without any retaining sutures.

At the time his first paper was written, Gifford was using both lip and skin and was uncertain which was preferable, but after a year or so he gave up the Thiersch flap, and has since used lip almost exclusively, because although the skin graft cured the entropion, it remained skin, and the accumulated epidermis on its surface produced a very slight discomfort, unless, it was wiped off once or twice a week. For the last fifteen years he has, in operating for trichiasis, generally done a modification of the van Millingen operation, putting a lip-graft into the split lid-margin; but in cases with the margin turned in extra far, he has put the lip into the tarsal surface, as above described, and has added Hotz stitches later, if necessary. His reason for limiting the procedure to exceptional cases is that it has seemed easier to put the lip-graft into the lid-margin. Moreover, for the beginner especially, this latter method has a great advantage in that there is no danger of leaving lashes on the wrong side of the cut. The cosmetic effect is also somewhat better, especially if the lip-graft is placed in the lower lid.

New Plastic Operation for Entropion. This procedure is described by Flavel B. Tiffany.⁴ It consists of grafting a strip of skin from the lid into the intra-marginal space, thus widening the space and wedging all the lashes away from the eyeball. It matters not which lid is operated on, as the technique of the operation is practically the same for either the superior or the inferior eyelid.

The writer makes an incision from near the punctum to the outer canthus, parallel to and about 2 mm. from the margin of the lid; then makes a second incision parallel to and about 3 mm. from the first incision, making the strip a little wider than the normal intramarginal space. He then dissects up the narrow strip, freeing it from all areolar tissue, but leaving it attached at either end. With the keratome he next slits the intra-marginal space at the conjunctival or mucous line, from the punctum to the outer canthus; going deep into the tarsus, and taking care to embrace all the lashes with the hair bulbs in the superior flap. The hemorrhage having been well checked, he divides the strip of skin in the middle; and then with the keratome makes, near either pedicle, an opening into the slot.

Through these small openings he draws the free ends of the skin graft and places them in the slot, first taking care to free the graft from all adipose or areolar tissue. If there is much redundancy of skin, and the strips are too long, he shortens them to the desired length and joins the two ends by a catgut suture. This is the only suture used in the grafts. If the hemorrhage has been thoroughly checked and the skin is placed smoothly in the slot, there is no occasion for any further sutures either in the graft or in the slot.

The advantage of this operation over any previous operation is that there is a living pedicle at each end, and the graft is secured in the slot or groove merely by one suture, and that confined entirely to the graft. If the operation is carefully and accurately done it will, according to the writer, not only correct entropion but any trichiasis or distichiasis as well, affecting a per-

(4) *Cphthalmology*, October, 1914.

manent cure and in many cases improving the appearance of the lid.

Necrosis of the Lids. The origin of most of these peculiar cases is the chief purpose of a report by Eppenstein.⁵ He details two cases from infection by streptococci, and one due to lues and an infection by *Staphylococcus pyogenes aureus*. The latter case proved that Wassermann's reaction ought always to be made if there is slight suspicion of lues, even if for many reasons lues is improbable. Each case of necrosis of the lids must be scrutinized in all detail. Generally a relatively simple therapy will be indicated, with satisfactory results.

Operation for Ptosis. An effective, simple and easily-performed operative procedure based, as the author observes, on the methods of Hotz, Eversbusch, de Grandemont and Gruening, is described by J. H. Claiborne.⁷

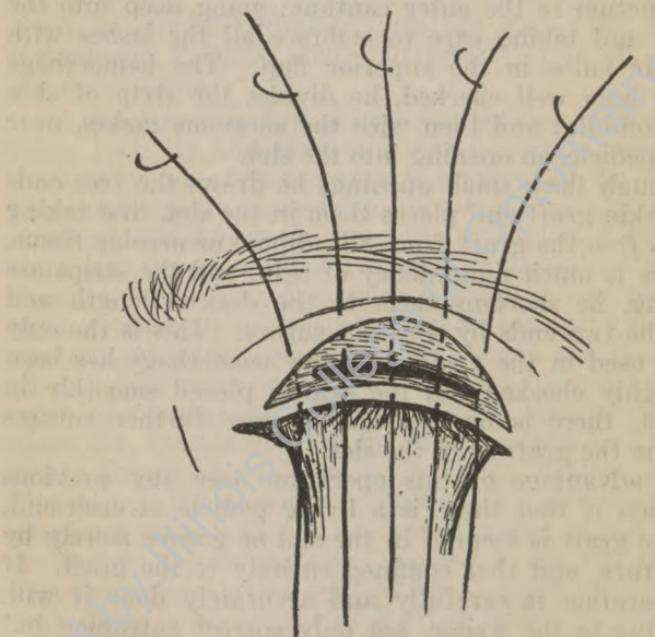


Fig. 4.—Claiborne's Ptosis Operation.

(5) Zeitschr. f. Augenheilk., p. 16, July, 1914.
(7) Ophthalmology, July, 1914.

The skin being smoothed, the entire lid is clasped with a large clamp. A straight incision is made from 3 to 4 mm. from the free palpebral border, across the extension of the clamp. An elliptical incision connecting the inner and outer end of the first incision exposes the tarsus, the skin removed depending in size to some extent on the effect desired. Generally, it should be from 5 to 8 mm. at the highest point of the curve. A piece of tarsus including the conjunctiva from 12 to 15 mm. in length and 2 to 3 in breadth, parallelogram in shape, is removed, a distance of 3 to 4 mm. from the inferior cutaneous lip, thus fenestrating the tarsus. The length of the fenestra as shown in the cut is too long, though its position is exactly correct. Five stitches are used, a central and four lateral ones; the central stitch being of slightly stouter thread than the others. The needle is passed through the center of the lower skin wound, about 2 mm. from the edge; it is again grasped by the needle holder and a deep orbital vertical stitch is taken in the tarsal-orbital fascia; this is facilitated by insinuating the forceps underneath the upper skin lip and slightly lifting it, so as to expose the tarso-orbital fascia; again the needle is drawn out and is grasped by the holder; the last stitch is taken through the upper lip about 2 mm. from the edge, so that the needle has been inserted three times—the first through the lower cutaneous lip, the second in the subcutaneous tarsol-orbital fascia, and the third through the upper cutaneous lip—all three stitches lying in the same vertical plane. Let it be remembered that the needle is grasped anew for each stitch—otherwise the result is not obtained; four lateral stitches are inserted in like manner. The clasp is then removed and the stitches are tied so that there is no buckling of the skin wound. It will be observed that no stitches have been taken in the tarsal wound. While this operation may not be considered entirely original, it is entitled to be classed by itself for several reasons.

In Gruening's operation an elliptical piece is removed from the tarsus: the piece taken from the tarsus in this operation is parallelogram shaped, and is slightly shorter than that in the operation of Gruening; in addition, no skin is removed in his operation, while the stitches are

put in the tarsus, the skin wound falling together by reason of the closing of the lips of the tarsal wound.

After healing, if the lid be turned, a slight buckling of the tarsal wound will be noticed. This produces no discomfort, or any other effect on the eye.

DISEASES OF THE CONJUNCTIVA.

CONJUNCTIVITIS.

“Squirrel Plague” Conjunctivitis in Man. Probably the most original ocular investigation of the year is that made in this department of ophthalmology by Derrick T. Vail.⁸ The Editor consequently gives this matter some prominence, and refers the reader to the original paper for a more complete account of this interesting subject.

The disease may be more definitely described as *Bacillus tularensis* infection of the eye.

It is believed that this is the first report of infection of the human eye from the virus of a plague-like disease among certain rodents, notably the California ground squirrel, and now known as “squirrel plague.”

The case presented such unique, alarming and peculiar ocular symptoms that it was impossible from anything written in ophthalmic literature to render a clinical diagnosis.

Vail describes his own case of ocular infection, as follows: E. E., male, aged 28, was referred to Vail on November 24, 1913, on account of an acute and violent inflammation of his left eye. He was a meat cutter in a restaurant. The history, family and personal, was negative. Three days before Vail saw him the left eye became inflamed and swollen. The lid margins were agglutinated in the morning. “Noticed a ‘sore lump’ in front of the left ear; eye discharged much watery secretion; has no pain; vision unaffected.” Inspection showed the right eye, normal.

Left eye: Marked redness and swelling of both eyelids; intense chemosis present; eye discharges mucowatery secretion; lashes matted, tuft-like; general ap-

(8) Ophthal. Rec., October, 1914.

pearance of eye suggests gonorrhœal ophthalmia. The pre-auricular gland on that side is swollen to the size of a small cherry and is tender to touch. Cornea, clear; tension, normal; iris, normal; pupil, normal in size and

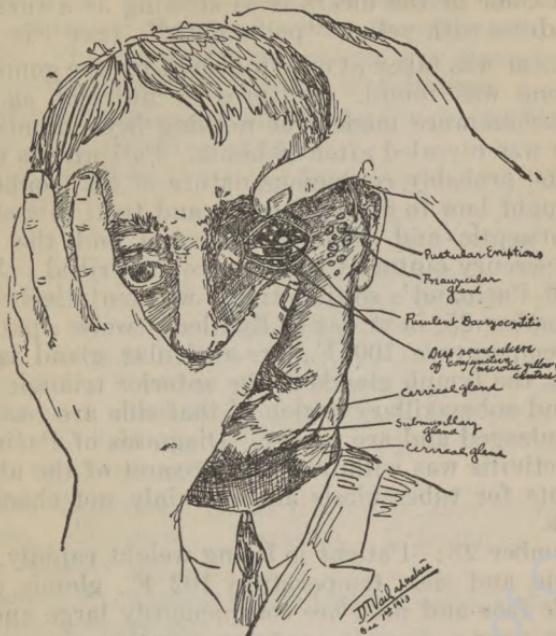


Fig. 5.—Necrotic Lymph Nodes in Squirrel Plague Conjunctivitis and Glandular Involvement of Face and Neck.

reaction; dioptric media, clear; ophthalmoscopic examination, negative. Vision, normal.

Palpebral conjunctiva: On evertting the eyelids, the seat of disease is revealed. The conjunctiva is riddled with about ten discrete deep, round, yellow necrotic ulcers, that run clear through the substantia propria of the conjunctiva quite to the tarsus. There are six such round ulcers over the upper tarsus and four at least over the lower tarsus. The ulcers appear punched out, but filled with golden yellow necrotic plugs. Sizes vary from 6.0 m.m., the largest, which exists near the upper edge of the tarsus of the upper lid, to about 1.0 m.m. The surrounding conjunctiva is deep red, very soggy and

swollen, but does not bleed on being wiped with a wet cotton sponge. The necrotic plugs in the beds of the ulcers can not be wiped away. The contrast between the deep red color of the conjunctiva and the brilliant golden color of the ulcers is as striking as a turkey-red calico dress with yellow "polka dots." (See Fig. 5.)

A smear was taken at once to search for the gonococcus, but none was found. Cultures in nutrient agar and blood-serum were made, but nothing beyond mixed infection was revealed after 48 hours. Patient was warned as to the probably contagious nature of his trouble, and was taught how to cleanse his eye and treat himself with the antiseptic and astringent washes and the yellow oxide mercury ointment which were prescribed. A diagnosis of Parinaud's conjunctivitis was tentatively made.

November 25, next day: Eye looks worse; patient is pale, temperature 100 F., pre-auricular gland is more swollen, the lymph glands of the anterior triangle of the neck and submaxillary region of that side are easily felt to be enlarged and are tender. Diagnosis of Parinaud's conjunctivitis was withdrawn on account of the ulcers—too acute for tuberculosis and certainly not chancre or syphilis.

November 28: Patient is losing weight rapidly, looks cachectic and sick, temperature 102 F., glands of the left side face and neck are conspicuously large and now there is seen a discrete pustular eruption six or seven in number and 4 to 5 m.m. in size, something like the pustules of varicella, located on the left temple and malar region. The appearance of the left eye is not improved; cornea is, however, brilliant and vision unaffected. The left nostril discharges a watery mucus freely. The left turbinate bodies are swollen and red. On account of the nasal symptoms and the pustular eruption on the left malar, the diagnosis is changed to "glanders or farcy" and patient urged to go to the Cincinnati Hospital, where he could get the benefit of proper treatment and laboratory diagnosis.

December 1: Patient did not go to the hospital; objected to leaving his family. Wants to continue treatment at Vail's office. A new symptom developed since two days ago. Infection of the left lachrymal sac with

every evidence of abscess formation. The ulcers of the conjunctiva remain about the same in appearance, but are slightly more numerous. They are not epithelial ulcers, such as we see in herpes, but perforate the conjunctiva quite to the tarsus. *Evidently the solitary lymph nodes of the conjunctiva are the seat of the necrosis.* The accompanying sketch was made to illustrate the appearance of the case at this time.

Dr. Robert Sattler saw him in the Cincinnati Hospital, and noted the following changes:

Left eye: Lids puffed and reddened; swelling size of hazel nut at inner canthus (purulent dacryocystitis); ocular conjunctiva much congested; on eversion of lids palpebral conjunctiva seen much thickened, roughened and reddened; conjunctival ulcers are present; pressure on tear sac, which has consistency of well-filled bladder, does not evacuate it into the eye or nose; a half-dozen large pustules between the left eye and ear; anterior auricular and anterior cervical glands and those about angle of the jaw are enlarged; no glandular enlargements at right side of face.

Lungs: Negative. Heart and circulatory apparatus: Negative. Abdomen: Negative. Extremities: Genitalia: Negative.

December 9: Abscess of the tear sac incised, discharging yellow, creamy pus.

December 10: Drainage from the abscess has ceased. Conjunctival ulcers gone. Ocular condition much improved, but pre-auricular and other glands remain enlarged.

December 11: Patient discharged, improved. The temperature chart shows the typical rise and fall of a general septic infection, highest being 102.6 F., evenings of December 4 and 5, but the morning temperature never below 100 F. until after December 5.

Several unsuccessful attempts were made to see the patient after he left the hospital, although he wrote saying he had recovered.

How could the infection of the California ground-squirrel-plague find its way into this patient's left eye in Cincinnati?

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1. Wherry in his last article, just published (*Journal of Infectious Diseases*, September, 1914), says that "a year previously (to this case) we had heard from a hunter that wild rabbits were dying in large numbers across the Ohio River in Kentucky." Moreover, this man was infected during the hunting season when the market is open to the sale of rabbits, and I, myself (being a hunter), was interested in reading in a Cincinnati daily of date about Nov. 20, 1913, a note from rabbit hunters in the vicinity of Cincinnati, stating that they were finding large numbers of dead rabbits in the fields and the opinion that they were being exterminated by a plague of some sort.

2. Health Officer Landis, of Cincinnati, learning the markets of the city were selling rotten rabbits, investigated and found large quantities of putrid rabbits on sale at five cents apiece. He rightly condemned all of them and reports that 36,420 pounds of decayed rabbits were seized and destroyed between Nov. 1 and Dec. 6, 1913. This patient was infected in the height of this season.

3. This patient was by occupation a meat cutter in a cheap restaurant located in the tenement and slum district of the city close to the markets. The inference is fair that rabbits affected with *caseous buboes* came to his table for cutting, that he held the diseased meat in his left hand, cutting with the knife held in his right hand, and that he introduced the poison into his left eye from his left finger. We have no proof for this, but it would pass for "Sherlock Holmes" evidence.

A New Method of Treating Diplobacillary Conjunctivitis. The double transposition of a potassium fluoride and zinc sulphate resulted in the production of a fluorescein-zinc compound. This is a reddish yellow powder, soluble in water only in 1 to 1000 solution, and contains 15.8 per cent. of zinc. With this compound L. K. Wolff⁹ treated ten patients with true Morax-Axenfeld conjunctivitis by distributing this finely pulverized powder onto the conjunctiva and following it by light massage. All the patients were cured by one, or at the most two, applications within from twenty-

four to forty-eight hours, and the only disadvantage manifest was the green discoloration of the tears for twenty-four hours.

Experimentally the compound proved to have a higher bactericidal power than zinc sulphate or any of the astringents in common use. Wolff attempted to decide whether the success of the compound was due to bacteriacidins, described by Schneider, but was unable to find the presence of these bodies at all. He believes that the more rapid effect of the drug is due to its continued action upon the infecting organisms. As the compound is only slightly soluble, it remains for a long time in the conjunctival sac and consequently its action is prolonged.

[A colleague of the Editor has made a rather extended use of this remedy in cases of proved Morax-Axenfeld conjunctivitis and finds that it acts promptly and satisfactorily. In view of this experience, the Editor suggests that we make a trial of an agent that has so many virtues to commend it.—Ed.]

TRACHOMA.

Immunity From Trachoma. In a former publication Meyerhof¹ of Cairo expressed the opinion, that there can not exist an acquired immunity from trachoma after having been affected with the disease. There is no race of the earth which can not be infected by trachoma. From the intact state of one eye, if the other is diseased, one can not conclude that the healthy eye is immune. The writer reported in the former publication two cases of late infection of the healthy eye in youthful persons and, now adds another one in a Greek, aged 58, after the trachoma had existed on the other eye for over three years. It is remarkable how frequently one-sided trachoma, although rare, causes such violent suffering. The infection took place in the right eye during or shortly after the excision according to Heisrath and Kuhnt. The incubation therefore fluctuated between four and six days. The scantiness of secretion was out of all proportion to the violence of the other phenomena

(1) Centralbl. f. prakt. Augenheilk., Vol. 37, p. 161.

and course of a very acute trachoma, and offered a clinical difference from other acute infections of the conjunctiva.

Epitheliosis Desquamativa (Samoa Conjunctivitis) and Trachoma. The disease of the cornea known as *epitheliosis desquamativa* was for the first time brought under careful observation by A. Leber,² and received its name, in the year 1910, in Samoa. It is not restricted, however, to that island group and the neighboring archipelago; its distribution is far more extensive, reaching New Zealand, Tonga, and perhaps Fiji; and it can be traced even to the northernmost islands of the South Sea. Judging from descriptions in the old writings of such explorers as Cook, La Perouse, Hunter, Thompson and others, we must look on its occurrence in those parts, if not quite certainly, at any rate with great probability, as epidemic. The great exacerbations, which it apparently underwent, caused it to be looked on as a new affection, its appearance raising all sorts of superstitious notions. In German Samoa, it appeared anew twenty years ago, in a specially virulent form, and this is the date usually assigned to its first appearance there.

The clinical study of it was impeded by the fact that a genuine epitheliosis may co-exist with other conjunctival diseases of bacterial origin, which latter affections also occur separately at times. Thus, in the first instance, we find a specific conjunctivitis caused by the *Diplococcus samoensis*, with symptoms of extraordinary severity leading to tremendous damage to the eye; secondly, a conjunctivitis caused by the *Diplobacillus Morax-Axenfeld*; and, thirdly, a conjunctivitis in the causation of which another bacterium belonging to the group of hemophile bacilli is concerned.

The course of these diseases, while comparatively favorable as they occur in Samoa, is always aggravated by the superaddition of epitheliosis.

Epitheliosis, although in reality a chronic affection, has an acute commencement. It runs a clinical course, as a rule, parallel with that of trachoma, but without the grave consequences of that infection. The first stage is

(2) Review in Ophthalmology from the Australasian Medical Gazette, of June 7, 1913.

characterized by an acute inflammation of the conjunctiva, the palpebral portion specially participating. There is moderately diffused thickening, a velvety, even swelling, redness more or less vivid; and there issues forth a thin, watery secretion, free from mucus, and containing a specially large number of epithelial cells. From this desquamation the name of the disease is derived. After several weeks of this condition the second stage follows, evolving slowly, not suddenly, from the first. The universally diffused swelling subsides, and in the conjunctiva—which has by this time in other respects resumed its natural aspect—we observe the presence of islands, sharply differentiated from the conjunctiva itself by their pale appearance and their elevation above the surrounding tissue. These papillary islands of the second stage, varying in size from the smallest point to areas covering the whole of the upper lid, differ from those of trachoma by a firmer texture, a slighter elevation, and the absence of the brawny character. Very seldom is there a development of real follicles, a sign which, clinically at least, is accounted pathognomonic in conjunctivitis granulosa; equally uncommon are those untoward complications that generally follow retrogression of the follicles in cases of trachoma.

Treatment of Trachoma. In his daily operative work as an ophthalmologist among the Indians C. H. Dewey³ has performed a great many *expression operations* for trachoma. A recital of his experiences are of practical interest.

As a large percentage of the cases are in children it has caused him to consider the anesthetic and instruments that cause least discomfort to the patient and yet afford rapidity and efficiency to his work.

The patient is prepared in the usual manner for operation; then, to check the smarting of the stronger cocaine application a drop of 4 per cent. solution of cocaine hydrochloride is instilled in the conjunctival sac and repeated in four minutes. After a few minutes the patient is placed on the operating chair and powdered cocaine is applied to the everted lids with a damped cotton-wound applicator, special care being given to the

conjunctiva of the retro-tarsal folds and the inferior cul-de-sac, which is very sensitive. In from one and one-half to two minutes the anesthesia will permit of an almost painless expression. Though the cornea has in a few instances become steamy Dewey has had no bad results in over 500 cases. The cornea is kept flooded with a warm saturated solution of boric acid during the operation. This method of anesthesia will permit one patient to go through the preliminary preparation while another is undergoing the operation. The one in preparation gains courage when he sees that the other suffers so little; thus no time is lost in persuasion or in offering explanations.

The upper lid is everted and granules removed from the tarsal plate and retro-tarsal fold by placing one blade of the expression forceps (Prince's, Noyes' or Knapp's) in the fornix and the other over the tarsal plate, then, with firm pressure, the granules are stripped from their bed. When the tarsal plate appears to be clear of granules, grasp the superior margin of the tarsal plate with a pair of forceps (Prince's) and make a second eversion, asking the patient to look down. This gives an excellent view of the entire retro-tarsal conjunctiva where the granules are most numerous and gives an opportunity to remove every visible granule.

Not infrequently after what appears to be a thorough expression, when the debris is wiped away with a pledge of cotton, a number of granules will have been missed, especially in the outer canthi. Some of these seem to evade the forceps and are annoying to the operator. To overcome this difficulty the writer has devised what he calls a trachoma burr,—an olive-shaped burr milled in its entire circumference, having one side smooth. With a rubbing and half turn of the instrument the granules that are so elusive and so resistant to after-treatment are removed.

Frequently when the granules are sparse and small he does the entire operation with this burr. It removes the trachomatous tissue readily and causes the least discomfort of any method he has used.

The granules on the lower lid are expressed in practically the same manner as those on the upper, but the

procedure is more difficult for the beginner. The thumb nail should be placed firmly against its outer wall to steady the tarsal plate which is narrow and hard to manage with the forceps. Here the trachoma burr may be used to advantage. A repetition of the operation is rarely ever necessary if the after-treatment is not neglected.

Having completed the operation the conjunctival sac is flushed with a warm solution of boracic acid or is wiped clean with a cotton pledge, one drop of 1 to 1000 adrenaline solution and one of 25 per cent. solution of argyrol are instilled. The patient is put to bed or in a comfortable reclining position and compresses applied to the eyes as hot as can be borne. These are changed at intervals of a few minutes,—the patient usually indicating when they begin to cool. To protect the hands and permit of the application of hotter compresses a wringer is made from a strip of canton flannel five or six inches wide and approximately ten inches long, with a hem on both ends sufficiently large to pass sticks for handles. The compress is placed in this and the handles twisted until it is sufficiently dry.

When the patient is free from pain,—usually in from thirty minutes to an hour, or at most, two hours—the compresses are removed and after an hour he is permitted to return to his home, if near, and instructed to report for treatment the following morning. It is much better for the patient to spend the first night in the hospital.

For two or three mornings the lids will be adherent. These are usually cared for by the patient with the aid of hot water, if not, they should be opened by moistening with warm boric-acid solution and the secretions loosened and removed with a pledge of cotton. The conjunctiva is flushed with the same solution and a drop of 25 per cent. solution of argyrol instilled. Light treatment should be continued daily for a week when the patient will be ready for the regular routine treatment, which is as yet not standardized.

Since there is so much discussion as to the proper procedure after operation Dewey submits without comment, a copy of the instructions he leaves with the nurse who

carries out the after-treatment. It has given him the best results and causes very little discomfort to the patient. It is a daily treatment for trachoma: (1) Inspect conjunctiva and cornea for abnormal conditions; (2) flush eyes with warm saturated solution of boric acid or normal salt solution; (3) (when copper sulphate pencil is not used) dust powdered boric acid on everted lids with cotton pledge, use friction massage; (4) (when copper sulphate pencil is used) instill one or two drops of 4 per cent. cocaine solution (for few weeks only); (5) apply copper sulphate pencil; 1 per cent. yellow oxide of mercury ointment; 5 to 10 per cent. copper citrate ointment or 15 per cent. thiosinamine ointment, if ointment is used massage lightly; (6) if copper sulphate pencil is used flush out eye to remove excess of copper (pencil should be applied lightly to tarsal plate and fornices).

First and second stages: Mondays, Wednesdays and Fridays use yellow oxide ointment. Tuesdays and Thursdays use copper citrate ointment. Saturdays use copper sulphate pencil (also Wednesdays if instructed).

Third stage: Same as above, except on Wednesdays and Saturdays use thiosinamine ointment.

Trachoma Treated With the *Bacillus Bulgaricus*.

This rather novel treatment of a case of old trachoma is given by Dr. A. W. Daggett,⁴ a general practitioner. The report is as follows:

Dorothy B., aged 8, had had trachoma since she was two or three years of age and had been treated for two years. "I tried to send the family to a specialist, but they would not go. I then proceeded to treat her as best I could.

"I used copper sulphate every other day for almost a year, with practically no result. I tried silver nitrate, bichloride of mercury, argyrol, protargol, and every other thing that I could find recommended, but all to no avail. Then I decided to try the Bulgarian-bacillus tablets.

"Accordingly, I reduced a small portion of a tablet to fine powder and turned the eyelid as if to burn with bluestone and put on the powder. Very much to my

(4) Am. Jour. Clin. Med., February, 1914.

surprise the little girl said that it did not hurt. I informed the parents that it was an experiment with me and for them to apply the remedy twice daily for a while and report progress. Very much to our surprise, there was marked improvement from the very beginning.

"The morning-blindness was soon gone, the photophobia all disappeared, the inflammation left the lids. The patient now reads by artificial light without any discomfort whatever, and one can not tell by looking at her eyes that she ever had trachoma or any other eye trouble. She has been on this treatment for about two months and is still using it, but will stop soon."

Tarsus-Extrirpation in Trachoma. In his doctorate thesis on this subject T. J. N. Arntz⁵ gives the following account of the procedure as carried out in Straub's clinic at Amsterdam.

Speaking of the relations of trachomatous scarring to the tarsal tissues Straub points out that on inspection this scar is found on the middle of the tarsus; it has with the same force pulled at the lid margin, wherewith it did at the fornix conjunctiva. This stretching is seen in the enlargement of the distance of the lashes to the border of the skin and mucous membrane and that the openings of the Meibomian glands do not lie in the skin, but in the mucous membrane. These are no longer round, but are small lines. This explains why the lashes are now found in two rows; the large majority still forms one uninterrupted row, but between this and the border between skin and mucous membrane often other rows of hairs are seen, much smaller in number and size.

To understand the progressing malformation of the lid margin the tarsus must not be considered to be connected immovably with the skin of the lid margin. When the tarsal mucosa degenerates into scar tissue and this scar contracts toward the middle of the posterior tarsal surface the skin of the marginal border is pulled, so that it is dragged toward the posterior surface of the lid. This skin in its turn pulls at the skin of the anterior surface of the lid, so that the entire lid border begins to turn round the distal margin of the tarsus; and this constitutes entropion. The interrelation of the parts

(5) Review and abstract from Ophthalmology.

does not remain the same, *i. e.*, the sharp margin, which normally exists between the intermarginal part and the posterior surface of the lid, becomes blunted.

Straub operates in the following way:

The patient spends a few days in the hospital to improve as much as possible the condition of the conjunctiva. Seven minutes before the operation cocaine-adrenaline solution is injected beneath the skin of the upper lid, also under the fornix conjunctiva; then the specially adapted forceps of Steiner holds the lid and fixes it everted and tense. An incision is made, parallel to the lid margin, which frees the fornix-conjunctiva from the cicatrix. Three double-armed sutures are put into the fornix, which also take in something of the deeper tissue, as the levator muscle needs to be included. The tarsus is incised with a sharp knife perpendicular to its surface between scar and lid margin; special care being taken that in the corners enough of the tarsus is removed so that this recedes as far as the upper margin of the tarsus.

The tarsus is now elevated with forceps, its posterior surface, freed and then excised. A small strip remains connected with the lid margin. The six needles go between the tarsal strip and lid skin and pierce the skin, so that each needle becomes visible between the lashes. The sutures are tied over a bead, two at a time, and care must be taken that during this act the lid margin turns well forward. The side sutures should be near the canthi. A strip of plaster fixes the sutures on the forehead. The eye remains bandaged for one day only. At the fourth or third day the sutures are removed.

If the linear scar has not yet formed the incision is made 2.5 mm. away from the lid margin. The freeing of the conjunctiva is here less easy, so that often a small stroke must be sacrificed. The tarsus is incised along the same line.

The tarsus-extirpation was done at the Amsterdam clinic on 88 patients and 147 eyes. It had to be repeated in five cases. One indication for the operation was entropion and trichiasis (47 patients). It was performed 11 times on one, 31 times on both eyes. Arntz examined the vision before and after the operation, the condition

of the cornea after the operation, the position of the lashes, the width of the ocular slit, the frequency of the visits before and after, and noted the presence or absence of keratitis punctata superficialis, and comes to the conclusion that the tarsus-extirpation is an excellent operation for entropion and trichiasis.

The second indication was found in those cases of trachoma that did not respond to any conservative therapy, where careful medical and mechanical treatment did not heal the pannus, where the vision gradually became less and in which corneal ulcers appeared. In forty-two patients the operation was done with this indication; in twenty, one eye was operated on, in twenty-seven, both. In some cases the condition improved much, but in many little or no effect was visible.

[The Editor was probably the first one in this country to remove the tarsus for the relief of inveterate forms of trachoma, although he has not had much opportunity to perform this operation in cases that seemed to him to require it, yet his experience now amounts to over seventy operations. His opinions on the value of this procedure may be found in *The Surgical Treatment of Trachoma*, and *Exsection of the So-Called Tarsal Cartilage in Cases of Chronic Trachoma*. The extreme value of tarsus removal has caused him to recommend it in suitable cases to many of his *confrères*, and he has done what he could to encourage its employment. Again he reiterates that in advanced forms of trachoma not relieved or cured by simple means, extirpation of the diseased tarsus forms the most certain means in the power of the ophthalmic surgeon to end the ravages of an otherwise incurable disease.—ED.]

DISEASES OF THE CORNEA AND SCLERA.

Cholesterin Crystals in the Cornea. A woman, aged 80, who had had several relapses of keratitis and iridocyclitis, saw, when looking to the light, a figure like a flower before the left eye. In a whitish gray opacity extending to the center of the pupillary area Muszynski⁶ saw, in the lateral lower quadrant of the cornea, yellow-

(6) Centralbl. f. prakt. Augenheilk., Vol. 37, p. 321.

ish streaky crystals, which under the corneal microscope appeared as glistening scales. Marginal superficial vessels spread from the limbus into the cornea. Vision with minus ten diopters equalled six-eighteenths. The writer considers the relapsing inflammations of the cornea and the regressive metamorphosis of the inflammatory products (fatty degeneration) as the cause of the formation of cholesterolin crystals, which hitherto have not been observed in the cornea.

Keratoblasts in the Cornea. H. Salzer⁷ denies the claims of Bonnefon and Lacoste that the keratoblasts found in a regenerating cornea originate from leukocytes and vessel walls. He was able to show conclusively that these cells are direct offsprings from the corneal epithelium.

Actinomycosis of the Cornea. Three cases of actinomycosis of the cornea are reported by A. Löwenstein.⁸ They developed after injuries of the corneae in three men, working in the same coal mine, from pieces of coal. Non-operative treatment, continued for from three to ten weeks, was of no avail, until cauterization arrested the progress of the affection. Cultures and inoculations of rabbits with clear cultures showed actinomyces.

Endogenous Gonorrhreal Corneal Affections. In classifying a corneal involvement as endogenous keratitis gonorrhoeica the following requirements must, according to F. Pincus,⁹ be present: First, the presence of gonococci in the urethral or vaginal discharge at the time of onset of the keratitis. Second, the keratitis must not be the only manifestation of a systemic infection, but either preceding or following the keratitis there must be some other form of gonorrhreal metastasis. Third, the conjunctival secretion, if present, must be negative as to gonococci. Fourth, we must exclude the presence of a serofullosis, occurring with a gonorrhea, which might be the cause of the keratitis. The author does not believe that a well-defined clinical picture can be described.

Neuroparalytic Keratitis Following an Injection of Alcohol Into the Superior Maxillary Nerve in Facial Neuralgia. Four days after an injection of alcohol

(7) Münch. med. Wochenschr., July 7, 1914.

(8) Klin. Monatsbl. f. Augenheilk., p. 859, June, 1914.

(9) Arch. f. Ophthal., March, 1914.

into the right superior maxillary nerve from the pterygomaxillary fossa of a man, aged 40, A. Dutoit¹ noticed a superficial loss of substance with slight opacity of the parenchyma of the lower temporal quadrant of the right cornea. This condition developed with complete anesthesia of the cornea, conjunctiva and skin of the lids. Under instillations and subconjunctival injections of dionin the affection healed, so that about six weeks later Dutoit tried an injection of alcohol into the ophthalmic nerve at the supraorbital fissure with good results, and subsidence of the facial neuralgia. The writer thinks that the symptoms were due to a destructive process in the Gasserian ganglion in consequence of the injection of alcohol.

Specific Parenchymatous Keratitis. Iggersheimer² claims that in syphilitic infants there are spirochetes even in the healthy cornea. These spirochetes perish in course of time, but they leave an anaphylactic condition against the metabolic products of the organisms. If afterward spirochetes in another part of the body become active and flood the circulatory system with their toxic products, the cornea which is over-sensitized becomes inflamed. This condition we then call keratitis parenchymatosa.

[In practice, every case of parenchymatous keratitis may be treated as if it were specific even if the spirochetes are not found. The contrast between the present day (successful) treatment of this formidable affection of the eye and the uncertain results of therapy in former years is very striking. Where it is possible to use it, salvarsan is undoubtedly our sheet-anchor. Injections of this agent may be repeated as often as is necessary to cure the disease. In all cases recently seen by the Editor the course of the keratitis, as well as of the intra-ocular manifestations of the disease, has been favorably modified and shortened by a judicious salvarsan therapy.—
Ep.]

Small Superficial White Rings in the Cornea. A condition is described by G. Coats³ in which the clear cornea presented, in its superficial layers, a typical form of

(1) *Leitschr. f. Augenheilk.*, July, 1914.

(2) *Wien. med. Wochenschr.*, March 14, 1914.

(3) *Proc. Ophthal. Sect., Royal Soc. Med.*, Vol. VII.

dead chalky white ring. The ring is usually less than one mm. in diameter. The writer has observed two patients (aged 19 and 18 months respectively) without notable alteration. He reports the case of a boy, aged 11, who had multiple rings of the left cornea. The boy was injured by an explosion of gasoline, but this was not considered as an etiologic factor. Vision was 6/5. No explanation is given as to the pathology of the condition.

Xerosis Epithelialis With Involvement of the Cornea.

Three cases of monocular inflammation, admitted to the Ancon hospital, with corneal involvement due to the bacillus xerosis, are reported by H. V. Dutrow.⁴ They were seen in well-nourished individuals, aged 25, 22 and 30 years respectively. The ordinary methods of treatment had been of no avail, and the resulting vision ranged from a practically useless eye, or the counting of fingers, to 20/70. Dutrow gives a tabulation of a bacteriologic examination of forty cases, to determine the incidence of the *Bacillus xerosis*. This examination included Americans, Europeans and negroes. The reader cannot but note that the cultures from the left eye were negative in Americans, while 15 per cent. were positive in European patients. Twenty per cent. of the cultures taken from the right eye of the American patients were positive, while those from the European patients were negative. Cultures taken from the eyes of negroes revealed the *Bacillus xerosis* in either eye, but not in the same patient. In 10 per cent. of the latter cases, an unidentified biscuit-shaped diplococcus was found associated with the *Bacillus xerosis*.

Dutrow is of the opinion that the *Bacillus xerosis* is the etiologic factor in the keratomalacia of adults. He furthermore believes it important to build up the general health of these patients, and though he is not sure as to the therapeutic value of hexamethylenamine (urotropin) in this disease, he does not hesitate to recommend it in conjunction with tonics and a full diet with extras.

Sciero-Corneal Trephining for Staphyloma of the Cornea. The results of Elliot's trephining in seventeen cases are recorded by Reinhold.⁵ In thirteen the staphy-

(4) Proc. Canal Zone Med. Ass'n., pt. I, Vol. 4.

(5) Indian Med. Gaz., May, 1914.

loma was reduced by the establishment of free filtration between the aqueous in the anterior chamber and the subconjunctival tissue. No improvement of vision was obtained or expected in the majority of cases; all the patients but one were, however, pleased with the result and were relieved of an ugly deformity. In six cases vision was much improved, the distortion of images previously complained of being relieved. The operation is contra-indicated in cases in which it is suspected that the suspensory ligament has given way and the lens has ridden forward into the anterior chamber, for here there is not only liability of rupture of the lens capsule by the trephine (as happened in one case) but even if the trephining is successfully accomplished, the lens is apt to block the trephine hole, stopping filtration and so causing recurrence, as happened in two cases. In these cases, also, the hyaloid may be ruptured and the vitreous damaged. The conjunctival flap is taken from above and made as long as possible; the longer the flap the better the filtration. At the limbal edge great care must be exercised in splitting the cornea, as it is often abnormally thin owing to stretching and previous disease. Should perforation occur before the trephine is applied, the operation is completed by iris scissors, cutting out a triangular piece of sclero-cornea to effect filtration. A 2 mm. trephine is used, larger for very large staphylo-mata.

The iris does not usually prolapse, owing to disease and adhesions, so that this membrane, often brittle and bleeding, has to be pulled out with iris forceps. The blood may be subsequently washed out by McKeown's irrigator. A probe is passed into the anterior chamber to ensure free passage for aqueous. The flap is replaced and need not be stitched, unless it has been made below the cornea, when it is necessary. Both eyes are bandaged, and the first dressing made forty-eight hours later. Atropine is applied daily, to guard against iritis, and the eye operated on bandaged for eight or ten days. If filtration remains free the staphyloma, even if of large size (in one case so enormous as to make closure of the lids difficult), flattens down and the deformity is removed.

Mucous Membrane of the Lips in Keratoplasty. In three cases of trachoma with intense cicatricial shrinkings of the conjunctiva and progressive marginal ulcers of the cornea, von Mende⁶ covered the corneal lesion with mucous membrane transplanted from the lip. The operations were performed in the following manner: (1) detachment of the ocular conjunctiva from the limbus for from 3 to 4 mm. towards the periphery; (2) scraping of the ulcer and removal of its overhanging walls; (3) dissection of a flap of mucous membrane of the lip without fat and connective tissue, a few mm. larger than the defect to be covered; (4) implantation of the flap, so that it overlaps the limbus for a few mm., and under the detached ocular conjunctiva, generally it is not necessary to affix it by sutures; (5) suturing the wound in the lip; the dressing remains for 3 days and the bandage is left off on the ninth day. The writer reports results as very good; the flap healing in place and the underlying ulcers undergoing rapid repair. The cosmetic effect was also satisfactory.

Epithelial New Formation at the Limbus Removed by Mesothorium. In a woman, aged 53, a proliferation developed at the left temporal limbus, similar to a pterygium, and was removed. After six weeks a relapse occurred which was again removed and cauterized. Still later the whole periphery of the cornea was covered, in a width of from 2 to 4 mm., with flat, grey proliferations associated with scars of the conjunctiva downward and toward the temporal side, extending to the lower lid in the form of a symblepharon. As repeated excisions had no permanent effect the tumor was, on eighteen successive days for from one to three minutes, exposed by A. Köllner⁷ to radiations from mesothorium, 0.01 in a capsule. When the patient returned the tumor had completely subsided. Extremely fine, grey scar tissue marked its former seat at the periphery of the cornea. The histologic structure of the epithelial tumor differed from papilloma in the complete absence of blood-vessels.

Spérón's Abortive Treatment of Infectious Processes in the Cornea. Very good results with the treatment

(6) Klin. Monats. f. Augenheilk., Vol. 51, p. 238.
(7) Arch. f. Augenheilk., Vol. 77, p. 173.

of corneal ulcer with 20 per cent. sulphate of zinc, after the recommendation of Epéron, are reported by Purt-scher.⁸ He especially notes good results in serpiginous ulcer, traumatic ulcer, and spontaneous ulcer; also in a few cases of severe trachoma with pannus keratitis touching of the everted lids with the solution had a marked effect. Two cases of intense pannus healed quite rapidly.

Hereditary Blue Sclerotics and Brittle Bones. Although the opportunity afforded us in America of seeing this curious sign-complex are few, yet descriptions of cases illustrating it are always interesting. E. A. Cockayne⁹ of London, Eng., examined a child supposed to be suffering from rickets, and at once noticed the blueness of the sclerotics. An enquiry into the family history elicited the fact that several other members exhibited this peculiarity, and that all had suffered from sprains and fractures of the bones.

The child, a girl, is aged one year and ten months. The sclerotics are a deep uniform blue color; the fundi were not examined. She has never walked, and makes little attempt to stand. The hair is light in color, and the teeth normal. Skiagrams of the legs and right arm show no evidence of old fractures, nor is there is a history of any having occurred.

The middle of the shafts of the long bones show a normal amount of compact bone, but toward their extremities they appear to be more transparent than is usual at this age.

The epiphyses show no evidence of rickets. The child is smaller than her sister was at the same age.

The child's father has blue sclerotics, and broke both legs at the age of sixteen. He has had many other injuries since, and in July, 1913, was thrown over the handle-bars of his bicycle (an accident which seldom causes much damage) and broke one femur and several ribs. His sister has blue sclerotics and has broken her ankle by slipping off the bottom step of a staircase. She has also sprained her ankle in the same way. They are both much smaller than any of their brothers and sisters,

(8) Centralbl. f. prkt. Augenheilk., Vol. 37, p. 372.

(9) Ophthalmoscope, p. 271, May, 1914.

and are very thin; the man weighs only 7 st. 2 lbs. The other brothers and sisters are normal and have normal children.

The grandfather has blue sclerotics and brittle bones. He is very small and thin, weighing 7 st. 7 lbs., and has had innumerable accidents, having fractured at one time or another every long bone in the body, besides many ribs. He has also had many sprained joints. His first fracture occurred when he was 15 or 16 years old. His sister is very small, and has sprained both wrists and both ankles without adequate cause. She has blue sclerotics. The greatgrandfather was diminutive in size, had blue sclerotics, and suffered numerous sprains and fractures.

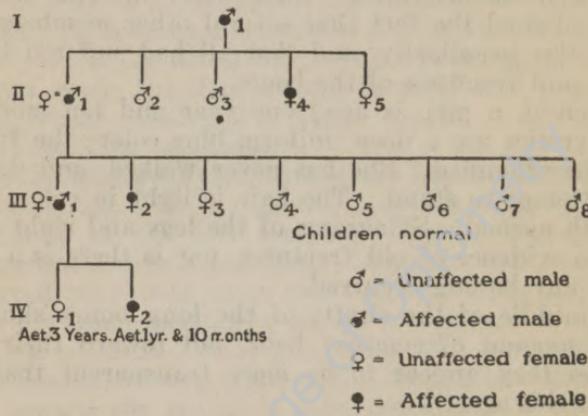


Fig. 6.—Hereditary Blue Sclerotics and Brittle Bones.

From this description it will be seen that the family agrees with those previously recorded, since the condition was first recognized by Eddowes in 1900, in that both sexes are affected and transmission only occurs directly through the affected members. Though blue sclerotics and brittle bones are the most obvious features, it is evident that they merely form part of a general condition. By the examination of an excised eye in an isolated example of the disease, it was shown that the blue sclerotics depended on an abnormal thinness of the fibrous tissue,

the fibers, although normal in thickness, were very deficient in numbers (L. Buchanan).

The cornea in this case was very thin and the anterior elastic lamina entirely absent. This probably accounts for the astigmatism from which many of these people suffer.

Bishop Harman has shown that the choroid is abnormally thin, giving rise to Fuchs' colobomata, with an oval appearance of the optic discs. The fractures are known to depend on a deficiency of the supporting framework of the bones. Cockayne thinks that considerable importance should be attached to the numerous sprains which have occurred in the family under consideration. Although possibly some of these were unrecognized fractures, it is highly improbable that all were injuries of this nature. It is more likely that all the fibrous structure round the joints are unduly thin and weak. The affected members of the family are all abnormally thin and light, two of the men weighing a little over 7 st. each, whereas the unaffected members are of average stature. This also appears to be important, although he can find no reference to size in the reports of other families, except in that of Harman, who remarks on the small physique of his cases.

The defect is probably one of the whole of the mesoblastic tissues of the body.

Careful examination of all the tissues, especially of the muscles, ligaments, and fasciae, are much needed to throw further light on the subject.

Brawny Scleritis. In depicting and describing this condition, Sydney Stephenson¹ remarks that among rare diseases of the eye none is more striking than that first fully described by W. Schlodtmann as "Brawny Infiltration of the Conjunctiva and Sclera." It occurred in three patients, aged 64, 74, and 74 years respectively. The disease was bilateral in two instances. A few analogous cases had been mentioned before the appearance of this communication, as by Baumgarten, Adolf Alt, and Schirmer, but it was reserved for Schlodtmann to characterize the disease as a clinical and pathological entity, and to bestow upon it the name of "Brawny Scleritis."

(1) *Ophthalmoscope*, May, 1914.

The malady has also been spoken of as "Annular Scleritis" and as "Gelatinous Scleritis."

Brawny scleritis, as described by Stephenson, is essentially a disease of middle life or old age, and affects men more often than women (Komoto). It runs an exceedingly chronic course, the even tenor of which is liable to be interrupted by exacerbations, as in Baumgarten's case, where attacks of pain, photophobia, lachrymation, and redness lasting for some twelve hours at a time came on about every month. Gilbert's case seems to be quite exceptional, since its course was very rapid, only a few weeks elapsing from the onset of the disease to removal of the affected eye.

That such eyes are only too often lost, although not from brawny scleritis pure and simple, is shown by the fact that pathologic reports of the condition are relatively numerous. More than one of the affected eyes has been removed under the idea that it contained a new growth.

To judge from the few published cases, the clinical appearances and the course of the disease are, however, sufficiently distinctive. A middle-aged or elderly patient, without known cause, is found to present a painless inflammation of the anterior segment of the globe, which usually affects both eyes, although not necessarily at the same moment or to the same extent. At an early stage inflammation may involve one portion of the circumference and spare the others, as in Komoto's case and in the case related in the present communication. Under any circumstances, it does not extend beyond the curvilinear line which marks the attachment of the recti tendons, possibly because the episcleral tissue is very thin and relatively non-vascular behind that landmark. The succulent infiltration, which in Stephenson's case pitted slightly on pressure, is diffuse, and has a curious reddish-brown hue, which once seen is scarcely likely to be mistaken for any other condition. It is important to note that this form of scleritis is not usually accompanied by nodulations, such as are common in ordinary scleritis. When such are present, they show distinctive features. It is only when the infiltration

PLATE V.



A. W. Hand 1913

Case of brawny scleritis.—Stephenson (see page 63).

Digitized by Illinois College of Optometry

involves the insertion of one or more of the recti tendons, as in cases by Oatman, Komoto, and Verhoeff, that a kind of nodulation is the result. Even then its origin would be more than merely suggested by its anatomic position and its square outline. Verhoeff thinks there is some reason for believing that "the essential process in the sclera begins at the insertions of one or more of the recti tendons, and from there involves the episclera in a chronic inflammatory reaction, and then penetrates the sclera and involves the uvea." In Stephenson's case, which was seen within three weeks of the commencement of the inflammation, and watched for many months, nothing of the kind was seen, though watched for. (See Plate V.)

In Oatman's case, the patient, a man aged 54, presented in one eye the unusual feature of a staphyloma on the temporal side of the sclera. A severe blow upon the affected eyeball set up intense pain, and the globe and the staphyloma became soft and fluctuating. After enucleation, it was found that the staphyloma was constituted by an ectasia of the sclera, in conjunction with a dense cellular deposit involving the tendon of the external rectus muscle at its insertion into the sclera. The sclera was completely ruptured at that place, thereby accounting for the flaccidity of the globe noted after the injury to the eye.

In the further course of the disease, the infiltration spreads into the cornea, probably through the ligamentum pectinatum, where it takes the form of a so-called "sclerosing keratitis." The anterior segment of the uveal tract becomes compromised, although usually not until late in the history of the case. This renders it extremely probable, as surmised by Baumgarten, Uthhoff, Parsons, Komoto, and others, that the affection of the uveal tract is secondary to the scleritis. In Verhoeff's case, indeed, the fact that the sclera showed marked tissue proliferation, whereas the episclera and uvea showed chiefly plasma cell infiltration, is almost enough to prove that the scleral process was the primary and essential factor in the symptom-complex. Clinically, implication of the anterior part of the uveal

tract is shown by sclerosing keratitis, keratitis punctata, posterior synechia, occlusion of the pupil, vitreous opacities, and lowered tension.

DISEASES OF THE UVEAL TRACT.

Peripheral Anterior Synechia. This sequel of iritic inflammation is of great importance mainly because of its relation to increase of intra-ocular tension, and iridectomy gives a permanent result only if there is no firm adhesion between the root of the iris and the posterior wall of the cornea, because only then can the purpose of the operation re-establishing the normal drainage of the eye be accomplished. The clinical diagnosis of such an adhesion is consequently of great value. R. Hesse,² with this purpose in view, describes a new method of illumination with a conical rod of 2 mm. diameter, similar to the lamp of Sachs, which allows a very good view of the extent of the anterior chamber. He found by this means that the border of the illumination lies 2 mm. behind the cornea. Direct proof of an anterior synechia in primary glaucoma succeeded only in one case. In cases of secondary glaucoma, also, the results differed. Two cases of glaucoma, with deep anterior chamber and enlarged eyeball, similar to primary hydrophthalmus, are described, in which the method excellently demonstrated the existence of a peripheral synechia.

A Peculiar Form of Retinal Pigmentation (Stephenson). The colored frontispiece illustrates a well-marked instance of this rare lesion, reported by Burton Chance.³ He refers to the four cases published in 1891 by Stephenson, who exhibited before the Ophthalmological Society of the United Kingdom, a peculiar form of retinal pigmentation. That observer had met with three cases only of this description in an examination of 2,500 eyes, and he was inclined to regard the condition to be commoner than might be inferred from the scantiness of the literature existing at that time. Chance has seen only four examples like those Stephenson showed.

The first case was noticed in the left eye of a boy of

(2) Klin. Monats. f. Augenheilk., March-April, 1914, p. 464.
(3) Ophthal. Rec., April, 1915.

10, who was sent, with a number of boys in October, 1910, for a routine examination of the eyes.

In the upper nasal section of the fundus of this boy's left eye, there were a number of groups of spots which extended far forward to beyond the equator. The spots were intensely black, and when seen two years later they had not changed.

At the first time the boy was seen, he had full visual acuity and he was entirely without other visual symptoms. The second time there were signs of disturbance of the retina-choroid associated with low-grade, uncorrected hyperopic astigmatism. There was an unusual arrangement of the upper vein; the central trunk extended but a short distance on the surface of the quite broad cup, before two main divisions occurred, and then, within the circle of the disk, many drooping twigs were given off to the temporal and nasal regions. The artery came out of the substance of the papilla near the edge of the disk.

The other case was found in the left eye of a young man who had received cerebral concussion during a coasting accident in February, 1914. The vision of his right eye was disturbed by subretinal edema, which did not subside for several months, and a central scotoma remains.

There were no symptoms in the left, the visual acuity equalling 5/5, and the field was regular in outline but somewhat reduced in area; there were no scotomata, however, and the color sense was normal and prompt.

Occupying the mid-temporal sector, in the space between the superior and inferior temporal vessels, and extending from the maculo-papillary region to far forwards beyond the equator were groups of chocolate brown and black spots, varying from the minutest sizes of two or three mm., or more, their diameter being less than that of the largest retinal vessels. The smallest spots were in the circum-macular region and the sizes increased until the largest at the extreme periphery. The spots were neither round nor square, but more or less angular and irregular in outline. They were arranged in groups, which assumed various shapes, some circular, or oval, or like a rosette figure with the center

free from visible pigment. Finer groups assumed the position of chains of diplococci, others lay isolated. The choroid and retina between the groups and between the spots were normal in appearance, and, as in the previously published cases, the spots here and there covered over the retinal vessels, while the greater number were beneath them. Most of the pigment collections, therefore, appeared to lie deeper than the retinal vessels. The individual spots and the collections were entirely without halos, or areas of degeneration about them. They were, on the contrary, sharply limited, and each spot and each group of spots had a well-defined outline; neither did the spots coalesce.

The nasal half was entirely devoid of spots, neither were there any other pigment aberrations perceptible.

With Stephenson, Chance does not believe these cases to be instances of retinitis pigmentosa; they are probably congenital.

Retino-Chorioiditis Juxta-Papillaris. As A. L. F. Appleman⁴ points out, this name was applied by Edmund Jensen to a localized inflammation involving the retina and choroid immediately beyond the disc. It occurs in young, healthy adults without a history of lues or other dyscrasiae, and presents a characteristic, absolute scotoma involving the region of the blind spot and extending to the periphery.

In four cases reported by Jensen the diseased area was at the upper margin of the disc in one case, at the inner margin in one, and at the lower margin in two. Blessig suggested for the disease the term chorioretinitis parapapillitis.

Appleman reports the following example of this rare affection:

P. M., aged 21, consulted Appleman in March, 1913, because of slight blurring of vision and slight pain in his left eye. This had appeared three days previously, with pain near the inner canthus, extending upward to a point in the forehead just above the brow—not radiating. He stated that the blurring seemed to be increasing since he first noticed it. He gave no history

(4) Ophthal. Rec., May, 1914.

of lues or other infection. The urine examination was negative.

Without glasses, vision equaled 5/6 in each eye; improved to normal by glasses.

Upon ophthalmoscopic examination the writer found the media clear. The disc was swollen + 3 D., and its edges were obscured. The swelling extended into the retina above and to the temporal side, gradually blending with the normal retina in the neighborhood of the macula. The swelling was white at its thickest part just off the disc, and gradually diminished towards its periphery.

The vessels were hidden by the swelling of the retinal fibers, the veins being engorged and tortuous. Slightly above the macula, four small, parallel, radially disposed hemorrhages were seen.

An examination of the visual field revealed an absolute scotoma involving the area of the blind spot and extending over a portion of the nasal field. At present, it involves practically the whole nasal field, as shown by the accompanying diagram.

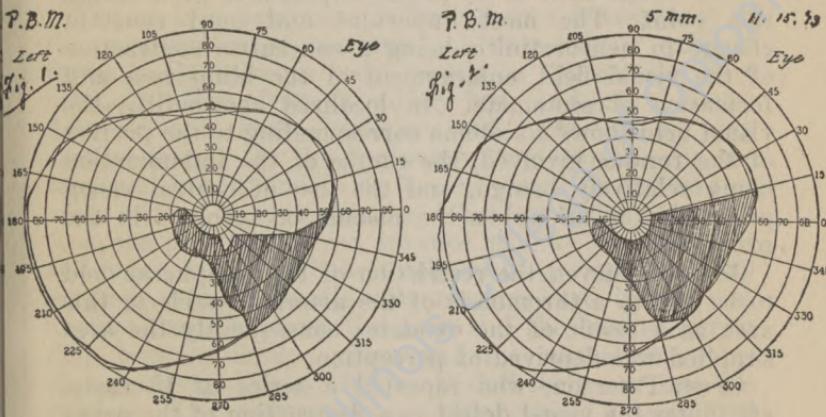


Fig. 7.—Fields for Form in a Case of Retino-Chorioiditis Juxta-Papillaris.

In the course of the following week after he was first seen, vision was reduced in the affected eye to 5/21, probably in part due to fine vitreous opacities which appeared about this time.

Treatment consisted in the use of hot compresses locally, and 1 per cent. atropine solution. Sweating by means of hot packs given daily, followed by inunctions of mercurial ointment to the point of salivation, and later the administration of potassium iodide. By these measures, the inflammatory condition began to improve, as did his vision.

The scotoma in the visual field extended gradually until at present it involves practically the entire nasal quadrant, probably due to degeneration of the nerve fibers involved in the inflammatory focus.

At the present time the man shows an area of degeneration near the disc, up and out, with some pigment heaping, involving an area about half the size of the disc, although there has been little chorioidal absorption. The disc edges are now fairly distinct. The vitreous opacities have disappeared, and his visual acuity is 5/6, improved to 5/5 with correction.

At the first examination, the ophthalmoscopic picture led to suspicion of neuroretinitis.

The visual field is of prime importance in deciding this point. The most important and most constant change in neuroretinitis being a concentric contraction of the visual field, enlargement of the blind spot and formation of scotomata. In localized chorioiditis, the visual field shows a scotoma corresponding to the portion of the fundus involved, the course of the inflammation being relatively benign, and the loss of central vision practically is *nil* unless the macula be involved in the process.

Jensen believed the restriction of the peripheral field to be due to a thrombosis of the arterial vessels in this area as a result of the exudate; consequently the area supplied was deprived of perception.

Gross Peterson, who reported a series of 15 cases, attributes the visual defect to a destruction of the nerve fibres by the inflammatory focus. This seems the most plausible explanation.

As to other causative factors of this condition, disease of the accessory nasal sinuses should be thought of: In this case, there was no evidence of such involvement and examination proved negative.

The possibility of a toxin giving rise to localized inflammation has been suggested, although not proved.

Absence of Cicatrization in the Iris After Operation or Injury. From a microscopic study of eight cases, M. McBurney⁵ confirms the observations of Fuchs that injuries to the iris, in the absence of hemorrhage and infection, show little or no tendency to scar formation or healing. Examination showed that the injured iris surface had remained either entirely unchanged or presented merely a slight antero-posterior contraction, with a little retraction from the cut surface of the processes of the pigment cells.

[These facts furnish a confirmation of the well-known explanation of the action of iridectomy in relieving the intra-ocular tension of glaucoma; through the spaces of the cut, unhealed iris the excessive fluid finds its outlet by osmosis mainly.—ED.]

The Cyclitic Membrane. The pigmented, string-like new formations, described by many as the cyclitic membrane, but differently interpreted by others, has been studied by J. Beets.⁷

The cyclitic membrane is formed as a consequence of the organization of exudates. A fibro-cellular exudate forms in the vitreous body, mostly in the anterior part behind the lens; from the ciliary body and into this exudate elements grow, organize, and replace it by connective tissue. In the beginning long spindle-cells are seen, which here and there become pencil-shaped and at other places form capillaries (that are chiefly derived from the pars plana) and advance into the vitreous. Alt and others considered these cells to be grown-out ciliary epithelia. Such spindle-cells are first seen in the connective tissue between the uvea and the lamina vitrea, then between lamina vitrea and the epithelium; later they perforate this epithelium to find their way into the exudate. The most numerous outgrowths of vascularized connective tissue originate in the ora serrata, then the pars plana produces additional vessels and connective tissue, while the ciliary processes produce the fewest. The cyclitic membrane fills the entire space behind the

(5) Arch. Ophthal., January, 1914.

(7) Doctorate Thesis, 1914.

lens, extends within the entire ring of the pars plana, or occupies the lenticular fossa in case the lens has disappeared. In the beginning the membrane is made up of loose spindle-cells and vessels; becomes more firm and then looks as a fresh scar with numerous interwoven spindle-cell bundles, wherein are vessels that originate chiefly from the ora serrata and pars plana. This tissue becomes adult connective tissue, and consists of bundles of fibers and endothelia, between which vessels still are seen. This tissue in the middle of the eye contracts and pulls at the neighboring tissues, wherewith it is connected. This connection is formed by the vessels, although since the older connective tissue does not need such a blood-supply many vessels become atrophied. These vessels become mere tissue strands and form supports for the cyclitic membrane, through which they can produce tissue displacements while contracting. These strands elongate the ciliary processes, and the cyclitic membrane may become loosened. This explains why many vascular strands in the cyclitic membrane are not connected with other vessels; they were pulled loose while still pervious to the blood-stream while other vessels became closed while still attached. It is possible that with the rupture of these nearly normal vessels blood became extravasated and became the matrix for the pigment of the vessel strands, although the great quantity of pigment makes it more probable that the older vascular strands, because of their origin from the uvea, again began to produce pigment.

Angioma of the Choroid. So far only nineteen examples of this neoplasm have been reported. None of these was clinically diagnosed. Ischreyt⁸ describes the tumor in a boy, aged 17, in feeble health. His right eye was always blind but not painful. For the last three weeks he had headache, lachrymation and photophobia. The anterior chamber was abolished, iris atrophic, pupil dilated; there were also intense pericorneal injection, increased tension, fundus not visible. The enucleated eye was hardened in alcohol. Meridional sections showed a flat tumor at the site of the choroid, whose greatest thickness near the posterior pole was from

1 to 1.45 mm. It consisted of a convolution of blood-vessels of different sizes, lined with endothelium and separated by septa, in other words, capillaries expanded into cavernae. The angioma originated in the exterior layers of the choroid, which was penetrated by capillaries growing in various directions.

Angioma of the choroid is a congenital disease. It is either present at birth or a congenital predisposition leads to its development in later life. It causes marked alterations of all parts of the eye in consequence of disturbances of circulation and nutrition. Ischreyt found thickening of the choroid, drusen of the hyaloid membrane, and ossification. Two small osseous foci clearly indicated as their place of origin the choriocapillaris. The nutrition of the eyeball is often interfered with to such an extent that it atrophies. In all reported cases the visual organ was totally destroyed.

Metastatic Carcinoma of the Choroid. A report of this rare neoplasm is given by U. Arisawa.⁹ A man, aged 72, had a typical intra-ocular tumor, but in whom the most careful examination of the interior organs showed no anomaly, so that it was diagnosed as primary sarcoma of the choroid. The microscopic examination of the enucleated eyeball, however, revealed carcinoma of the choroid, undoubtedly metastatic. A year after the commencement of the visual disturbance diarrhea, loss of weight and general weakness set in, and the patient died after two months. The post-mortem examination showed a primary, medullary, ulcerated carcinoma of the rectum and small metastatic tumors in the liver. The metastasis took place through the posterior ciliary arteries, as in most cases. In correspondence with these facts were the situation of the tumor at the region of the macula and the intense development of connective tissue in connection with the point of entrance of these arteries. Histologically, the tumor showed great similarity to the metastatic focus in the liver, viz., the structure of a scirrhus. Both metastases developed from the primary, adenoid, cylinder-celled carcinoma of the rectum. Histologic differences between the intra-ocular tumor and the

(9) Klin. Monats. f. Augenheilk., p. 695, May, 1914.

primary carcinoma of the rectum are, however, not unusual in metastases.

Gumma of the Ciliary Body and Optic Nerve. A clinical history and histologic report of this tumor is given by Matsukawa.¹ A man, aged 32, had a hard chancre and inguinal buboes in April, 1911. Eight months later he had iritis and, after three months, exhibited papulous syphilitic iritis, which rapidly subsided after an intravenous injection of 0.6 salvarsan, followed by mercury and iodine for a month. On admission the Wassermann reaction was positive. Six months later he returned with a gumma of the ciliary body in form of a bluish-red tumor at the inferior temporal limbus; an irregular pupil closed by grayish white exudations, iris adherent to the lens; V=0. On account of very severe pain the eye was enucleated.

The histologic examination revealed a gumma of the ciliary body and optic nerve. No spirochetes were found. The writer considers this as a neurorelapse and a luetic manifestation after salvarsan, although this condition generally occurs from four to five months after the primary sore, not one and one-half years, as in this case, and is not due to an intoxication by salvarsan.

THE CRYSTALLINE LENS.

The Weight of Infants' Lenses. G. A. Clapp² obtained material for these observations from infants aged from two weeks to five months. The lenses were removed in capsule from one to twenty-four hours after death, immediately weighed, and then dried and reweighed. The average weight was 0.0953 gm. Average weight of the solids was 0.0265 gm. There was a gradual increase in weight from birth until the fifth month. The average weight of the solids showed a proportionately greater increase with age.

Bilateral Coloboma of the Lens. An interesting account of this anomaly is given by F. Phinizy Calhoun.³ In one of the cases reported by the writer, the child,

(1) Klin. Monats. f. Augenheilk., Vol. 51, p. 665.

(2) Arch. Ophthal., Vol. 42, p. 618.

(3) Ophthalmology, p. 41, April, 1914.

aged 7, had worn glasses for three years on account of defective vision. The eyes of his father and mother were normal except for slight errors in refraction. The past history of the patient was negative for ocular injuries or inflammation. The patient was wearing — 7 S. in each eye. The irides were light grey and the left very slightly tremulous. The corneae measured 12 mm. in their horizontal diameters. Vision, R., 6/200; L., 2/200. Homatropine solution, used for two hours, showed pupils well dilated, and the lens and fundus changes were distinctly seen. In the right eye there were seen four punched out places in the nasal and inferior periphery of the lens; the most inferior one was largest and through it a bright red fundus reflex could be detected, whereas the upper three were less defined and partly covered by the pupillary margin of the iris (see illustrations). The fundus was characteristic of high myopia with mild changes in the chorioid at the posterior pole of the globe. It was difficult at first to say whether in the left eye the abnormality in the lens was one of coloboma or ectopia. There was a large bright crescent opening downward and inward through which the fundus could be studied with fair accuracy. There were seen no remnants of the suspensory ligament in this opening; in fact, at no place could it be found. The fundus of this eye was also characteristic of high myopia with chorioiditis. With a — 18 S. vision was improved to 2/200 in the right eye and unimproved in the left. -- 10 S. were prescribed.

The boy has been in school and keeps up remarkably well. The strength of his glasses has been increased every year for four years. Re-examined a few weeks ago, vision was found to be improved to 20/50 in his right eye with his full correction. The picture of the lens still remains unchanged and the myopic chorioiditis is apparently quiet. There is no iridodonesis in the left eye.

CATARACT.

The Frequency and Localization of Incipient Opacities of the Lens in Persons Over 60 Years Old. Investigations of the kind and localization of senile cataract

are published by T. Barth.⁴ His researches were made on both living and dead subjects, with the following results:

1. Clinically in 96 per cent. of all persons above 60 opacities of some sort were found.

2. The opacities of incipient cataract do not lie directly under capsule, but on the surface of the nucleus or in the deeper strata of the cortex. There is always a clear cortical layer between the capsule and the opacities. If subcapsular opacities are present, other opacities also exist in the deeper cortical strata.

3. If 96 per cent. of all persons show opacities of the lens the conclusion seems clear that senile cataract of moderate degree represents a physiologic senile change.

4. Hence it follows that we must not frighten an elderly patient exhibiting incipient opacities of the lens, with the diagnosis and prognosis of cataract, because in 96 per cent. of all persons above 60 opacities of the lens occur, and we are not able to judge whether the opacities will remain more or less stationary or will progress and finally lead to total cataract.

Cataracta Dermatogenes. Four cases of cataract associated with the following affections of the skin are reported by N. Andogsky:⁵ Erythema exudativum multiforme, discharging exanthema with abscesses, eczema with furuncles and general eczema. On account of a probable connection between opacities of the lens and affections of the skin this form of cataract is called dermatogenes. It shows the following characteristics: the opacities develop in youth, from the first decade to the fourth, in persons with previously normal eyes who suffer from extensive skin affections in form of various inflammations, atrophic changes or diseases of the blood-vessels. The opacities are bilateral and develop under the anterior capsule in the form of anterior stellate cataract, or in sectors. The changes begin, first of all, in the capsular epithelium; more rarely (when the vessels of the ciliary body participate) in the posterior subcapsular strata. These opacities progress rapidly and soon affect the whole lens, leading to total soft cataract, within from

(4) Zeitschr. f. Augenheilk., August, 1914.

(5) Klin. Monats., p. 284, June, 1914.

six to eight days in very young persons, in from one to three years in adults. They are not complicated by other changes in either the interior or the exterior parts of the eyes. Extraction of the lens or dissection, with or without subsequent linear extraction, usually give good results. According to Rothmund, the predisposition to this anomaly lies in the skin and lens, the latter being embryologically an invagination of the external skin. If changes in the anterior subcapsular strata are considered as a consequence of an auto-intoxication of the organism (in connection with extensive disturbances of the dermal function) a direct connection between the affection of the lens and the skin disease on account of this embryologic relationship, may be assumed.

Industrial Electricity as a Cause of Cataract. An example of this well-established form of cataract is reported by E. Lauder⁶ in a man, aged 22. He was not seen by the writer until fourteen months after the accident. Fine dustlike opacities appeared immediately beneath the anterior capsule, the right eye being worse than the left. Eight months later marked progress towards total opacity was observed in the right lens. Seven similar cases are briefly reviewed by the writer, who observes: "In four of the cases here reviewed, as well as that of my own, mention is made of the dustlike opacities appearing scattered over the anterior surface of the lens or directly beneath the anterior capsule in the early stage of the disturbance, while in the other three the disturbance involved the total anterior portion of lens or capsule. These observations are in accord with the laboratory experiments of Hess, who found the anatomic lesion to be a destruction of the crystalline epithelium. This corresponds with the fact that electricity is known to have an elective action on epithelial elements."

Dionin in Early Senile Cataract. E. L. Jones⁷ reports a trial of this agent in 15 cases. However, he does not claim priority in the use of dionin for the arrest of, or absorption of senile changes in the lens and recommends no one strength of solution and no definite time

(6) Ohio State Med. Jour., February, 1914.

(7) Ann. Ophthal., October, 1913.

nor frequency with which it should be used. He generally uses a 4 per cent. solution in cyanide of mercury 1 to 1000 and recommends that its use extend over a considerable period of time. He has injected the drug subconjunctivally in two cases with marked temporary improvement. Some of his patients used the drops daily for years. He has never seen any unfavorable effects nor any who had idiosyncrasies to its use. It smarts just the same after the hundredth application as after the first. The chemosis, so marked at first, soon ceases to appear. So-called strumous subjects have a very violent reaction from its use. Where the vision has been so reduced that no letters on the test card could be read, no improvement followed the use of dionin. The best results were noted in patients having a fair degree of distance vision, but with poor reading power. The ability to read easily is, according to the writer, usually restored and maintained for a considerable period. In incipient cases of capsular opacities he thinks that dionin is of value, notwithstanding the fact that the cases that give the best results from dionin are the cases which if left entirely alone show great variability and often make no change for years. Jones does not believe that cataract is a physiologic change, but a pathologic process due to a non-manifest uveitis, chorioiditis, toxemia or lymph stasis. He therefore concludes that the dionin, by removing a lymph stasis or by improving ocular nutrition, or breaking up a low grade uveitis or chorioiditis, the lens is made to retain it transparently. Lens cells advanced beyond a certain degree of opacification can not be made to clear up, but as these opacities are preceded by a haziness as the opacity extends, this haze can be cleared up and thus prevent further extension of the degenerative process.

[As will be seen in the reports of that meeting, Lt.-Col. Henry Smith gave at the 1914 Ophthalmological Congress at Oxford a most interesting account of his treatment of incipient cataract by means of subconjunctival injections of mercuric cyanate. The effects of this measure on the eye are much the same as that of dionin, only much more marked; the edema, pain, chemosis of the lid being, as is well known, very alarming to

one unaccustomed to the subconjunctival employment of the cyanate. However, the results, as detailed by Smith, seem encouraging and ophthalmologists should give the treatment a trial. The combination of 1 per cent. acoin with the cyanate (for the relief of the otherwise intense pain of the injection) should not be forgotten.—ED.]

The Smith-Indian Cataract Operation. Observations on a Thousand Cataract Extractions, Performed in Six Weeks at Shikarpur, India. This valuable report is given by H. T. Holland.⁸ Eight hundred of these were done by the Smith-Indian method; 180 with capsulotomy. The writer thinks 950 would have been done in the capsule had the three operators who performed the operations had the same experience. He thinks every operator ought to do from 50 to 100 extractions with capsulotomy before attempting expression in the capsule, as the latter is the more difficult operation. Capsulotomy he reserves for those cases in which the lens will not present except with greater pressure than he considers desirable to exert, and for cases with plus tension, to avoid chorioidal hemorrhage. After an experience of over 3,000 extractions the author considers the intracapsular method the operation of choice, as the eye recovers so much more rapidly after operation; while iritis and iridocyclitis are rarer than in patients operated on with capsulotomy; also sepsis is rarer. Economy in dressing (the first one on the fifth day) is also an advantage. The disadvantages he classifies as (a) escape of vitreous—becomes less frequent as skill increases and small losses are immaterial so far as vision is concerned; (b) U-shaped pupil—esthetically disadvantageous, but it does not seem to make any difference in giving a useful eye; (c) increased tendency to chorioidal hemorrhage—a debatable point, put by Smith as low as 1.5 per thousand. The author has not been equally fortunate, but thinks the carelessness of the stretcher bearer was responsible for several of the cases.

He thinks prolapse of iris is more common where the incision is far back, less where it is more purely corneal.

Early opening of the bandages is, he believes, a common cause of prolapsed iris. He found the actual cau-

ter, under general anesthesia, better treatment than cutting off the prolapse with scissors. He has not yet made up his mind about the advisability of leaving the eye for from four to six days unopened—as “this year we had at least three cases of sepsis and loss of the eye in which the patients complained of no pain at all, and yet on opening the eye we found pus streaming out.”

The preliminary treatment was recommended by Smith (douching with 1 in 2000 perchloride). Results are given in general terms and worked out at about 4.25 per cent. non-successful.

Major Baird⁹ gives two years' experience of extraction in the capsule with 1137 consecutive operations. The cases are given without selection and include all those done since Major Baird commenced to operate by this method alone. The cases are grouped in two classes, series A done at the headquarters hospitals under the author's own care after operation, and series B, in which the results were recorded by assistants at the cutlying dispensaries where the operations were done.

Cases	Vitreous escape	Capsule left	Result		
			Good	Fair	Failure
Series A... 178	18	13	154	13	11
“ B... 959	10.1 p.c.	7.3 p.c.	86.5 p.c.	7.3 p.c.	6.1 p.c.
	94	43	88	66	25
	9.7 p.c.	4.4 p.c.	90.5 p.c.	6.8 p.c.	2.6 p.c.
Total ... 1137	112	56	1022	79	36

The 10 per cent. *escapes of vitreous* the author divides into (1) those occurring during or on completion of the section while the spring speculum is still in. This includes nearly half the cases and would have occurred in any method. (2) Those occurring during expression of the lens, due to too much backward pressure with the hook, or to continual backward pressure after the lens has been dislocated, instead of immediately shifting the pressure upward in the direction of the wound. The number of these accidents should lessen with experience. (3) Those *after* expression, usually due to the assistant allowing the lower lid to come into action, unsupported by the upper lid, on closing the eye, or to the patient

looking persistently down. Baird thinks that Smith and Lister have disposed of the old idea that escape of vitreous is frequently followed by grave consequences.

In the fifty-six cases of *rupture of the capsule*, those in which the capsule was subsequently removed are not distinguished separately. In the writer's opinion when a lens has "somersaulted" the capsule can always be removed if it should burst; when it has not turned over, it can seldom be removed. Most of his failures have been with large intumescent lenses which he has not succeeded in "somersaulting," rupture of the capsule occurring, followed in a large percentage of cases by iritis and dense after-cataract. The liability to rupture in intumescent cases is, he thinks, due more to tension on the capsule than to its thinness.

As regards the value of *iridectomy* in these operations, Baird does not agree with Smith, whose advice is "always to do an iridectomy, simply to avoid prolapses." He has satisfied himself that iridectomy does not entirely eliminate prolapse, however carefully and successfully the iris is smoothed out at the angles of the wound, etc. As the results are more beautiful if no iridectomy be done, even if there is some incarceration of iris and drawing up of the pupil, the writer aims at a simple and not a combined expression, and in about 100 of his cases made a basal or buttonhole iridectomy. Unlike von Hess, however, he evidently does this *before* instead of after the expression of the lens.

Of the eleven failures in series A, five were due to sepsis, five to iritis with dense after-cataract, and one to choroidal hemorrhage.

The absence of iritis, little after-treatment required and the popularity of the operation with patients are commented on as arguments for the Smith-Indian operation.

Irrigation After Extracapsular Extraction of Cataract. E. A. R. Newman¹ has used this procedure in 102 consecutive cases. McKeown's apparatus was used, and the nozzle modified by being made angular instead of straight and with a lateral instead of a terminal slit. There was a separate nozzle for each eye, with the lateral

(1) Indian Med. Gaz., June, 1914.

slit directed toward the patient's feet. These modifications were introduced to lessen the danger of injuring the interior of the globe on account of sudden movements of the eye—a danger which is generally avoided by introducing the ordinary McKeown's nozzle obliquely and not at right angles into the wound. The writer thinks that irrigation—with saline solution—effectually removes *debris* of cortex and bits of capsule and improves the visual results, though the latter are not given owing to the great majority of the patients being illiterate and a certain unknown percentage never appearing again after discharge. Secondary needling was necessary for subsequent opacity of the posterior layer of the capsule in only three cases. Iritis was severe in two instances (resulting in loss of vision from occluded pupil), moderately severe in two and slight in two cases. In two more it supervened late (tenth day or later); in one of these following a blow. Vitreous escaped in one case after irrigation. In two cases of lost vision the patients removed the bandages and rubbed their eyes.

A Prophylactic Procedure for Difficult Extraction of the Lens. Komoto² describes his method as follows:

A triangular flap of the upper portion of the conjunctiva, from 5 to 6 mm. high, whose apex lies at the insertion of the superior rectus and the base at the upper corneal margin, is dissected, and both ends of a double-armed thread are carried through the apex, a few millimeters apart, from without in. The tendon of the superior rectus is then lifted with forceps, and both needles are inserted through the tendon from opposite sides. The loop thus formed is left loose. With a Graefe knife the sclera is incised close to the limbus and the lens extracted. During the operation the conjunctival flap is held with forceps, keeping the field of operation free. In case of prolapse of vitreous the ends of the thread are pulled taut, thus fixing the flap to the tendon of the superior rectus, so that the wound can not gape, and further loss of vitreous is prevented. The method has been successfully practiced by the writer for a long time.

Endogenous Infection After Cataract Operation. A contribution to this very practical subject is made by

(2) Zentralbl. f. prkt. Augenheilk., p. 41, February, 1914.

F. Schieck.³ A man, aged 46, during convalescence after a successful cataract extraction, with $V=5/8$, had a general infection with pus germs in the form of disturbances of the general condition associated with albuminuria. On the twelfth day after the operation (and uncomplicated wound healing) a severe iridocyclitis on the eye operate on set in. Since the wound itself was never infiltrated and the whole clinical picture pointed to a primary inflammation of the iris, Schieck is convinced that the infection did not start from the wound, but was of endogenous origin. Also its further course deviated considerably from the usual septic post-operative iridocyclitis, for complete recovery took place in spite of a fibrinous, purulent exudation which almost completely filled the anterior chamber. Whether this was due to injections of Deutschmann's serum he does not venture to decide.

Two similar observations, one by Rominée after severe bronchitis, and another by Wopfner after pneumonia, are quoted.

A Study in the Psychology of Vision. Learning to See. Another case of the "learning of vision" is added to the rather numerous accounts of this process, already described in ophthalmic literature. We are indebted to J. Herbert Fisher⁴ for this recent instance.

The patient was a girl in her seventh year. For about two years she had been attending a blind school. In the right eye the pupil was blocked by a membrane, and the vision was not better than the barest hand shadows. In the left eye there was a dense cataract and some thickening of the lens capsule, and no red reflex was obtainable. The pupil dilated on using a mydriatic; perception of light with this eye was good. Under a general anesthetic the lens of the left eye was removed. A week after the operation a healthy fundus could be seen with the ophthalmoscope. With approximate correction of her refraction tests were made at this time and two weeks after operation to determine whether or not the child could identify various objects by the sense of sight. It was found that the little patient failed in this unless

(3) *Zeitschr. f. Augenheilk.*, Vol. 30, p. 491.

(4) *Ophthal. Rev.*, June, 1914.

aided by other senses, particularly the sense of touch. A month after operation there was a little improvement in the recognition of objects. The author has seen the patient on more than one occasion since, and noted that the training of her sight powers is progressive.

Fisher found nothing to support Augstein's view that there are three stages in the recovery of vision, nor could he differentiate between education of the brain and education of the retina. He conceived that education both of the end-organ and of the center go on progressively and simultaneously in such cases before the ultimate best use can be made of the new-found sense of sight.

THE RETINA AND OPTIC NERVE.

Identical Visual Directions. The law of identical visual directions, elaborated by E. Hering in 1861, and that of J. Mueller of identical retinal points, Milutin⁵ regards as the most important discoveries in the physiology of the senses. As these laws are not generally accepted, Milutin wished to extend the previous experiments for a larger number of corresponding retinal points, which she did under the guidance of Prof. Asher of Berne. She describes a method for demonstrating the law of the identical visual directions and for keeping a graphic record of them. The validity of this law was demonstrated in the primary position for a larger number of eccentric retinal points, and also in secondary positions (raising the eyes, lateral movements of the head, etc.) for central and eccentric retinal points. The difference of direction which results between exact and approximately identical visual objects is distinctly noted. This was demonstrated by using the true horopter as the position of the fixed points. Care was taken that objects intentionally put next each other did not produce mistakes. The results found support the theory that the observation of the visual directions is the result of stable conditions in the retina.

Anatomic Study of the Temporal Conus (Coloboma) in an Hyperopic Eye. A case, similar to those reported in the author's case the eyeball had been removed on

by Elschnig and Fuchs, is described by E. V. L. Brown,⁶ account of a penetrating injury. Microscopic examination showed a crescentic defect in the choroid and the inner layers of the sclera along the temporal border of the disk. The defect was almost entirely bridged over and filled out by a fold of the retina. The nerve fibers did not dip back into the conus, but passed directly over into the nerve head. While the anterior layers of the sclera were absent over the floor of the conus, the sclera was nowhere ectatic. The eyeball had an axial length of 23 mm. Brown accepts Elschnig's theory of excessive proliferation of the margins of the secondary optic vesicle and subsequent interference with the development of the choroid, sclera and the nerve sheath.

Juvenile Retinal Periphlebitis. The evidence presented in a paper by B. Fleischer⁷ is a confirmation of the claims advanced several years ago by Axenfeld and Stock that many retinal lesions are tuberculous, although unsuspected. Fleischer reports the case of a man, 36 years old, with pulmonary tuberculosis. He came with extensive, unioocular, periphlebitic hemorrhages of unknown origin. These gradually absorbed. One year later he reappeared with a nodular iritis and extensive hemorrhagic retinal periphlebitis in the other eye. The iritis gradually led to an absolute secondary glaucoma and the eye was enucleated. Histologically, the retinal hemorrhages were found to be associated with extensive tuberculous masses in and around the veins. Many of the veins were completely choked with tuberculous debris. The author believes that the affection of the posterior aspects of the eye was retrogressive, and originated in the anterior half of the eyeball.

Angiogliomatosis Retinae, the So-Called von Hippel's Disease. The clinical history of a man, aged 20, who presented the characteristic ophthalmoscopic picture of von Hippel's disease is published by J. Meller.⁸ Intense ectasia and tortuosity of an artery and the accompanying inferior temporal vein, gray opacity and thickening of the retina at the periphery, large round red patches

(6) Arch. Ophthal., p. 254, May, 1914.

(7) Klin. Monats. f. Augenheilk., June, 1914.

(8) Arch. f. Ophthal., p. 255, II, Vol. 85.

into which the vessels submerge were the chief signs. In discussing the pathology of the affection Meller believes that this thickening of the retina is apparently the primary process, due to a proliferation of glia without any symptoms of inflammation. It has a certain similarity to the changes in beginning glioma of the retina, as in two cases early observed by Sachs and Knape. The ectasia and tortuosity of the retinal vessels, the aneurysmal swelling (imparting to the vessels the appearance of a rosary) and new formation of vascular convolutions are not necessarily signs of a primary disease of the vessels but may be a consequence of the formation of tumor of the retina. Meller opposes the explanation of von Hippel that the proliferation of the glia is a reaction of the tissues to the proliferation of the blood-vessels, pointing out that too much importance must not be attributed to the vascular changes and that in neoplasms totally unlike the vessels participate secondarily to such a degree that they appear to constitute quantitatively not only their main, but their essential part. He therefore believes that the correct anatomo-pathologic term for this disease is *gliosis retinae diffusa teleangiectodes*.

Another case of retinal angioglioma is reported by Ginsberg and Spiro,⁹ who furnish the clinical history of and the anatomic changes in the left eye of a boy, aged 15, who complained of flickering and impairment of vision. With the signs of acute optic neuritis, a flame-like whitish opacity developed at the temporal margin of the disc and extended to the distance of a disc diameter, ensheathing the vessels, which were not tortuous. The opacity increased rapidly within four weeks to a tumor-like, yellowish-red elevation of 6 D., and led after two years to detachment of the retina. Two years later, attacks of glaucoma set in, which finally, after six years' duration of the disease, necessitated enucleation. In the right eye a yellowish-red nodule, 2/3 disc diameter large, developed in the periphery of the retina and remained unaltered up to date.

The whole left retina showed glious degeneration. The gliosis was most intense at the optic nerve and decreased

(9) Arch. f. Ophthal., Vol. 88, p. 44.

toward the equator, extending to the ora serrata. Behind were inflammatory changes, small-celled infiltration of the vascular walls and abundant sero-fibrinous exudations. Morphologically, the process consisted in the formation of multiple tumors composed of glia and blood-vessels, for which Ginsberg prefers the term angiogliomatosis retinae. Probably owing to the central seat of the tumor in the left eye, the common sequelae of the disease, *viz.*, detachment of the retina, chorioiditis with formation of coagulations and bone and, finally, glaucoma set in. In spite of these destructive changes the peripheral, solitary, yellowish-red nodule in the right eye remained unchanged for seven years, showing that the affection may remain stationary for a very long time.

Obstruction of the Central Retinal Vein. A valuable review of this subject from observations of 36 cases is given by George Coats.¹ His conclusions are that almost all cases of obstruction of the central vein are probably caused by true thrombosis. Microscopically the thrombus may be visible as a homogeneous, structureless mass. More frequently an invasion of fibroblasts from the surrounding connective tissue or of secondary proliferation of endothelium is found, the final result of the changes. In most cases the essential cause of thrombosis seems to be retardation of circulation due to vascular sclerosis, especially endarteritis of the central artery. It may also be due to a primary inflammation of the vascular wall, especially in young persons, and caused, *e. g.*, by syphilis, influenza, etc. Microscopically, a primary affection of the venous wall is rare. Fibrous degeneration and infiltration above the obstruction are frequent and must be considered as secondary changes. The obstruction always occurs at or near, the lamina cribrosa. The vein very rarely remains collapsed and empty above the obstruction. In most cases the blood-current is soon restored by the collateral circulation, earlier if the central artery is relatively free from disease and the propelling force not weakened. In other cases the blood-current is restored by canalization of the thrombus. Immediately above the obstruction the vein is generally small and its wall slightly infiltrated, but not thickened. Farther upwards

(1) Arch. f. Ophthal., p. 341, Vol. 86.

in the nerve trunk the fibrous tissue of the wall is thickened and infiltrated.

The retinal vessels show the following changes: fibrous proliferation, hyaline degeneration, proliferations of the endothelium, inflammatory infiltration of the walls, thrombosis, teleangiectasia. Of these, fibrous proliferation is the most frequent in both arteries and veins. The most frequent affection of the central artery is disease of the intima alone. Proliferation of the endothelium in the retinal vessels is relatively rare and is probably a reaction to irritation by the circulating toxin. Ophthalmoscopically, proliferations of the endothelium appear as irregularities of caliber, fibrous degenerations (silver-wire artery) and white lines along the vessels. It is doubtful whether the complete typical picture of retinal apoplexy ever occurs in obstruction of the retinal vein alone and the central vein remains free. Teleangiectasia of pre-existing vessels indicates a difference of pressure between two vessels or two portions of the same vessel. Alterations in the retinal vessels are partly primary, partly secondary; the primary are more frequent in the arteries, the secondary may also occur in the arteries, but are especially frequent in the veins.

Diseases of the ciliary vascular system associated with retinal vein obstruction are much rarer. Apparently the extent of retinal hemorrhages depends to a certain degree on the intensity of the endarteritis in the central artery. If this is lacking and the propelling force is not diminished, it is likely to be profuse.

Glaucoma, which frequently follows obstruction of the central vein, is a direct consequence and is not an independent affection due to angiosclerosis in the anterior segment of the eye. It does not show the type of primary glaucoma. The anterior chamber is generally of normal depth; a new formation of vessels at the surface of the iris is very common, and there are no distinct inflammatory symptoms. A vascular fibrous membrane is found at the surface of the iris, caused by deposits of inflammatory cells on the iris and in the sinus. Glaucoma is the consequence of closure of the efferent paths by these cells. According to Inouye this affection of the iris and sinus is caused by toxins, which are diffused from the

disintegrated blood of the posterior segment of the eye through the vitreous to the iris, while the excretion of the toxins is impeded by the obstruction of the central vein. This is probably the reason why other forms of intra-ocular hemorrhages are rarely followed by glaucoma. This is also the reason why an interval of from three to four months occurs between the outbreak of glaucoma and the thrombosis.

Detachment of the Retina. A summary of A. Perlmann's² views of this important matter is as follows: (1) Perforating injuries may lead to detachment of the retina, whether the eye is predisposed to detachment or not; (2) if detachment of the retina occurs in consequence of a new formation, the question arises whether this new formation is the consequence of an injury, which in most cases must be denied; (3) a blunt injury (concussion) is never capable of producing detachment of the retina in a healthy eye; (4) quite a number of persons are, in consequence of ocular or general affections, constantly threatened by detachment of the retina—this occurs if the disease is sufficiently advanced, without external force; (5) if such a patient can plausibly prove an accident and a connection between accident and detachment, the etiologic connection will be affirmed in spite of considerable scientific doubts; (6) a severe strain during work can not be regarded as injury of the above kind.

In the *treatment of detached retina* C. Fehr³ regards equally distributed pressure, in the form of a pressure bandage, after evacuation of the subretinal fluid, as an effective agent for the cure of detachment of the retina. The bandage flattens the punctured eye from before backward; the contents of the eyeball are compressed, the vitreous presses the retina equally and permanently against the sclera (smoothing its folds) and the remnants of the subretinal fluid are expressed.

The puncture is performed, while the patient is sitting, with a broad cataract knife in a meridional direction, after which it is turned 90°. Within the last five years Fehr has treated thirty-three cases of marked detachment of the retina, without selection. They were

(2) Zeitschr. f. Augenheilk., p. 41, January, 1914.
(3) Arch. f. Ophthal., Vol. 85, page 336.

twenty-two men and eleven women, aged from 16 to 73 years. Sixteen had excessive myopia, seven of slight or medium degree; ten, emmetropia. In five traumatism had preceded the detachment, one with perforation and loss of vitreous; four after myopia operations. In three cases the detachment existed for four weeks; in eighteen from two to three months; in six about six months and in six one year or longer. The operation was performed in nineteen cases once, in eleven twice, in three three times. After these fifty punctures the first ophthalmoscopic examination revealed a complete re-attachment in twenty-two instances, in sixteen traces of detachment, and in thirteen portions of detached retina remained; but the detachment was always less and the bluish projections disappeared.

In fourteen cases the operation was unsuccessful; in six, although a complete re-attachment was not attained, the patients were yet improved; in five, in which the operation effected a re-attachment, the patients had a relapse after three months and longer. Ten gave prospects of a permanent cure; the time of observation after the re-attachment was in two cases from three to four weeks; in two from three to four months; in one, a year; in three, one and one-half years; in one, four years and in one five years. The fact that a patient in whom the retina had remained in place for three and one-half years had a relapse, shows that one cannot speak of a *cure* even after years. Consequently Fehr prefers the term "prospect of a permanent cure." The chances for a cure are the better the earlier the operation is performed. The writer never saw any injurious effect of the compressive bandage after puncture. He considers it contraindicated in cases of excessive myopia with a very thin sclera and projecting eyeballs, and in brittle vessels with a tendency to hemorrhage; also, if the detachment is flat and circumscribed without inclination to spread.

A case of detachment has been successfully treated by W. R. Parker⁴ by means of scleral trephining. The case was one of double neuroretinitis, associated with partial retinal detachment, of one year duration. The sclera was trephined over the site of the detachment and an incision

(4) Trans. Am. Ophthal. Soc., Vol. 13, Part 3, 1914, p. 661.

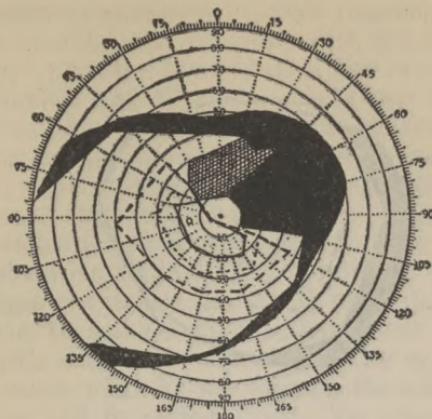


Fig. 8.—Visual Field Before Operation.
 Green — Red . . . Blue — — —

made in the choroid and retina. This was followed by a discharge of straw-colored fluid, and a small amount of vitreous. Following the operation the whole bulbar conjunctiva became markedly edematous, the reaction subsiding in ten days and the retina becoming re-attached. There was no recurrence after a period of eight months. Before operation, vision equalled 4/60;

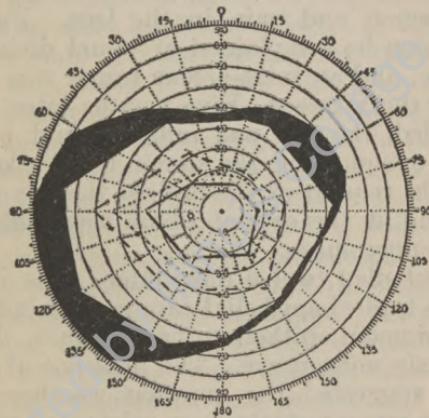


Fig. 9.—Visual Field Three Weeks After Operation.
 Green — Red . . . Blue — — —

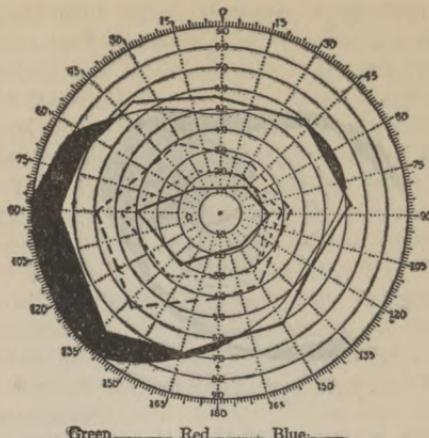


Fig. 10.—Visual Field Seven Months After Operation.

after operation, vision was 6/12. Seven months after operation the tension was 20 mm. Hg, and the visual field was nearly normal.

Carcinoma of the Retina. An example of this exceedingly rare neoplasm is reported by O. Arisawa.⁵ A man, aged 30, had, as laparotomy showed, an inoperable carcinoma of the abdominal cavity, originating in the pancreas. There were swollen glands in the left supra-clavicular region and pain in the legs. Four months after admission he complained of visual disturbances in the right eye, and an intra-ocular tumor was found projecting into the vitreous. Five months later the eyeball had protruded, the eye was inflamed and painful, the media were opaque, and the tumor had broken through the orbit. On request of the patient the eye was enucleated. Behind it the orbital tissue was infiltrated, but showed no tumor mass.

The patient died twelve days later. The intra-ocular tumor was a typical epithelial carcinoma, confined to the retina, the pigment epithelium being intact. It occurred in a previously normal eye. The presence of an abdominal tumor suggested the question whether the intra-ocular tumor was a metastasis or originated primarily in

the eye, causing metastasis in other organs. The latter theory was adopted. It certainly was the first observation of a true primary carcinoma of the retina.

Optic Neuritis and Myelitis. Fifty-two cases of this form of optic involvement have been published, the following being the fifty-second. It is unique in the fact that the patient, when attacked by the disease, was older than any patients in any case yet published. The patient was a cotton merchant, 60 years of age. He was first seen by C. Goulden⁶ on Nov. 19, 1912. The history he gave was that six days previously he could read the newspaper as usual, but that the next day, November 14, his eyes seemed a little dim in the morning. The eyesight failed gradually, until, when he was seen on the sixth day after the onset, he had to be led about. On examination the pupils were found to be dilated widely, and they did not respond to light. The media were clear, and there was no lesion to be seen in the fundus other than a slight fluffiness of the edges of the optic disc. The vision was reduced to the perception of hand movements and there was a central color scotoma, for red. On examination he was found to be a healthy and vigorous man, well-preserved. Pulse and temperature were normal, but in the urine there was a trace of albumin; no sugar. Specific gravity was 1012. Heart and lungs were quite healthy. Two days later, on November 21, he complained of a peculiar sensation in his feet and legs. It was then found that he had some difficulty in moving them about, and could only lift them from the bed by a great effort. On testing the sensation the legs were found to be anesthetic, the anesthesia extending almost to the umbilicus. The knee and plantar reflexes were absent. Two days later, on November 23, he was completely paralyzed below the waist, and had lost control of both bladder and rectum. The temperature had occasionally risen to 101 F., and the pulse-rate remained continuously over 100. The eye condition remained unchanged, the vision became no worse, and the result of several ophthalmoscopic examinations revealed no more change than that found when the first examination was made. His general condition became worse; the anesthesia rose higher and

(6) *Ophthal. Rev.*, July, 1914.

higher until it reached a level of the fourth intercostal space in front. He died of exhaustion on November 29, ten days after he was first seen and sixteen after the first-noticed failure of sight.

Goulden takes up in detail the symptomatology, pathology, and hypotheses as to the nature of the disease and concludes with the following summary:

1. There is a rare condition, named by Devic "*Neuro-myélite optique aiguë*," in which myelitis, acute or subacute, is associated with optic neuritis, acute or subacute, the acute neuritis accompanying acute myelitis, the subacute myelitis accompanying the subacute optic neuritis.

2. Usually the optic neuritis (frequently papillitis and more rarely retrobulbar) precedes the myelitis. It is very rare for the neuritis and myelitis to appear simultaneously.

3. There is a tendency for both the optic neuritis and myelitis to end in improvement, but complete recovery is very rare, especially in acute cases.

4. Pathologic examination shows that the lesions in the cord may be very diffuse and extensive, but yet they may be confined to one part of the spinal cord and that may be the lumbar enlargement.

5. The lesions in the optic nerves are most marked anterior to the chiasma, but may extend throughout the optic tracts.

6. The lesions are produced by some common agent acting on both spinal cord and optic nerves. This agent acts directly on the nervous structures, especially on the white matter, and not by way of the meninges. Most likely it is an infective agent.

THE OCULAR MUSCLES.

Retraction Movements of the Eye. John Green⁷ points out that the choanoid muscle causes retraction of the globe. He then gives the acquired causes of retraction in man, after which he mentions a congenital anomaly (Duane's syndrome), the features of which have been summarized by Duane himself as complete (less

(7) Trans. Amer. Acad. of Ophthal. and Oto-Laryngol., 1913.

often partial) absence of outward movement in the affected eye; partial (rarely complete) deficiency of movement inward of the affected eye; retraction in adduction; oblique movements up and in or down and in, in adduction; partial closure of the eyelids of the affected eye in adduction; paresis or marked deficiency of convergence, the affected eye remaining fixed while the sound eye is converging.

After commenting on the fifty-four cases collected by Duane and published in 1905, Green adds four of his own. He is inclined to the opinion expressed by Duane and shared by Birch-Hirschfeld, "that in general an operation is not required and is to be avoided when possible." There are instances, however, where he believes operative procedure would seem to be rational, and an instance is given of a young girl, without the power of adduction since two years of age, who obtained an additive power of 30 degrees by having the superior and inferior recti muscles split and the temporal halves inserted at the line of attachment of the external rectus muscle.

Nystagmus. This important subject has been thoroughly discussed by a number of authorities. That *labyrinthine conditions undoubtedly produced nystagmus* is held by Sydney Scott.⁸ Rhythmic nystagmus might be produced in normal people by applying excessive stimuli to the semicircular canals, such as by rapid rotation, irrigating the ear with hot or cold water, or application of the galvanic current. He expresses the view that "the deviation of the head and eyes is in the same direction as the current in the endolymph, and the nystagmus is in the opposite direction." He has met with twenty-three examples of the "fistel symptom," and in nearly every case he has been able to verify the existence of a labyrinthine fistula, though many cases of fistula occurred without the "fistel symptom" being produced. Spontaneous labyrinthine nystagmus resembles induced nystagmus in kind and degree, being always symmetrical and generally unilateral. The less acute forms are sometimes seen in cases of acute or chronic otitis media. Spontaneous rhythmic rotary nystagmus to one side is also

(8) *Trans. Ophthal. Sec. Royal Soc. of Med.*, February, 1914.

met with when the opposite labyrinth has become functionless, and disappears again when both become destroyed. If the labyrinth be stimulated in cases of total blindness, such as result from primary optic atrophy unaccompanied by intracranial disease, rhythmic nystagmus can be provoked by rotation or irrigation. When one labyrinth is defunct spontaneous nystagmus may be arrested by pressure on the carotid sheath of the normal side. It is possible to measure the strength of the stimulus required to produce nystagmus, for sometimes it is easier to be obtained on one side than on the other.

Holmes Spicer⁶ reported that in 200 cases the *movements of the eyes* were horizontal in nearly 50 per cent., rotatory in 15 per cent., vertical in 12 per cent., mixed in 4 per cent., irregular and circumductory in 2 per cent. each. The horizontal and vertical forms were nearly always conjugate but condivergent in a few cases; the rotatory cases were nearly always conjugate, but convergent ones had been seen.

Use of the eyes is essential to the existence of nystagmus. The eyes were quiet during sleep, and sometimes so in the dark. It sometimes happened that on covering one eye, oscillations commenced in both. Unilateral nystagmus was not uncommon, and the movements were usually vertical, but not always. If the nystagmus had been recently acquired, a sensation of movement of objects was produced, but this was never noticed in the congenital cases. Nystagmus did not occur in those born blind, or in those who became so very soon after birth. It often became more marked with fatigue; in some cases light produced it, and in some it became more apparent in the dark. Some persons were able to produce nystagmus at will.

The most important causative factor was a defective retinal image, due either to a corneal or a lenticular lesion or to some abnormal nerve or retinal condition. Errors of refraction had not been proved to cause this, but corrections of high degrees of astigmatism had often led to great improvement, or even to cessation of the nystagmus. Many of these patients had large refractive errors. Albinos and those with excessive pigmentation often had

nystagmus. The pigment which affects eyes in this manner is usually supposed to be that of the retinal epithelium, but this can not be recognized by the ophthalmoscope, as the choroidal pigment masks it, and this might really be the case in those who were not obviously albinotic. In some cases the nystagmus was hereditary, but its cause not definitely ascertained.

As regards occupation-nystagmus, the weight of evidence is on the side of bad fixation being the primary cause, and besides miners, compositors are often affected. In *spasmus nutans* the head movements preceded the nystagmus by a few weeks, and they bore no relation to each other. The condition is supposed to be due to an instability of the motor centers.

L. T. Lister¹ has dealt with the *relation of miner's nystagmus to general nystagmus*. In the former the oscillation of the eyeballs is only one, though an important one, of the physical signs and symptoms. In miners the nystagmus produces marked subjective symptoms, while an ordinary person with nystagmus might not notice it. In miners the oscillation is of a rotatory character, and is usually equally marked in both eyes. The nystagmus is increased on exertion or by making the patient look up. It is usually brought to a standstill when the eyes are directed downward. In general nystagmus, the eye oscillation is usually lateral. The conditions producing nystagmus are those causing an inexact image to be formed on the retina; this is so in optic atrophy, marked errors of refraction, and corneal opacities. Albinism, with its lack of visual definition, is always associated with nystagmus. In dull illumination there is a tendency to use the peripheral portion of the retina. Arlt and Edridge-Green have suggested that the movements have the object of bringing fresh portions of the retina into play. The miner in his work not only finds great dullness, but almost a complete absence of color relief. In the better lighted mines there are but few cases of nystagmus. The author related some interesting observations on the lighting power of reflections from ordinary walls, which is practically absent from the face of the coal. Moreover, to be out of the way of the pick,

(1) British Med. Jour., March 14, 1914.

the lamp is often six feet or more from the face of the coal, and the available light is often not more than one-third of a candle-power, and it falls on a substance capable of absorbing 86 per cent. of the rays. Safety-lamp pits are hotbeds of the disease.

Of 900 consecutive cases of miner's nystagmus, 870 patients had worked with safety-lamps and thirty with candles, and twenty of the latter had at some time worked with safety-lamps. He noticed that several of the patients with the most severe cases of miner's nystagmus had fair hair and light-colored eyes. He does not agree with Snell that miner's nystagmus is due to the strain produced by the unnatural position of the head and eyes while hoisting; the man really looks straight at the spot to which he directs his pick. Moreover, working in an unnatural position in a good light does not cause the disease. These patients complain of loss of sight, especially at night, of headache, giddiness, and intolerance of light. Marked cases cause mental depression, and there may be tremor of eyelids, eyebrows, and even of the shoulders. The ultimate cause of the condition is want of coöordination in the mid-brain ocular center of Gowers, governing the associated movements of the eyes.

Insufficiency of Convergence; Its Diagnosis and Treatment. The Editor translated a paper on this ever important subject by Edmond Landolt,² and gives it here almost in full.

Landolt believes insufficient convergence to be one of the commonest causes of oculomuscular asthenopia. In the term *convergence* he includes all symmetrical movements inwards of the two eyes. By *positive convergence* he means actual, uniform convergence of the visual lines; in *negative convergence*, while the visual lines tend to approach yet the condition is really one of divergence.

First of all, it must be remembered that convergence should be considered as a whole, *i. e.*, with reference to all the factors that make up this regular and combined movement, and these we generally consider as covered by the term *amplitude of convergence*. This condition is determined by considering the *minimum* and *maximum* of convergence, by noting the most distant point (*punc-*

tum remotum) as well as the nearest point (*punctum proximum*) at which the patient can fix binocularly. It is evident that fixation of the same object by both eyes forms an angle of convergence which becomes larger the nearer the object is brought to the eyes. In other words, the size of the convergence angle is in inverse proportion

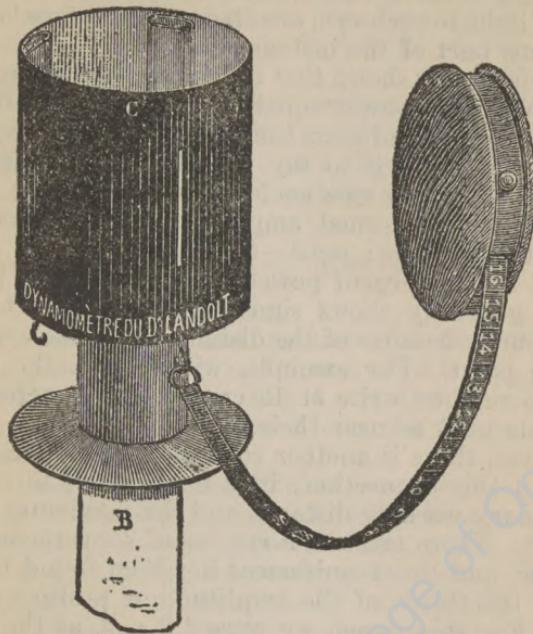


Fig. 11.—Landolt's Dynamometer.

to the distance that separates the eye from the object fixed. If, for example, that distance is represented by C, then the *degree or power* of convergence is equal to 1. If we take the *meter* as our measure of the distance that separates the *point of binocular fixation* from each eye then we obtain expressions of convergence power in *meter angles*. Thus we find that binocular fixation of an object one-third of a meter from the eyes requires, for each eye, an effort of 3 *m.a.* of convergence.

When the convergence is *positive*, the simplest means of registering the convergent power and to express it in

meter angles is by the use of the Landolt dynamometer, herewith pictured.

This little instrument is provided with a luminous point, furnished by a candle whose light shines through an opening in the hollow cylinder, which is used as the fixation point. The angular degrees of convergence, corresponding to the distance between the distance from the point of light to each eye, are stamped on a tape measure that forms part of the instrument.

Experience has shown that the normal, maximum, positive convergence power equals 9 *m.a.* or more. On the other hand, the minimum (negative) power may be said to be 1 *m.a.*, that is to say, the diverging visual lines extended *behind the eyes* enclose an angle of that degree. To estimate the normal amplitude of convergence we employ this formula: $a=9-(-1)=10\text{ m.a.}$

When the convergent power of a patient falls below 9 *m.a.* he generally shows signs of muscular asthenopia. This is partly because of the distance from the eye of his working point. For example, with 8 *m.a.* the patient ought to read or write at 12 cm.; and few persons are able to do work so near their eyes.

However, there is another consideration not to be forgotten in this connection; it is not enough to estimate the ordinary working distance and the maximum of convergence. There must be a *reserve* of convergence force or power, and this requirement has been found to equal at least two-thirds of the amplitude of positive convergence. For this reason we regard 9 *m.a.* as the proper amount for ordinary eyes; and of this one-third, *i. e.*, 3 *m.a.* may be regarded as the amount required for work, and 6 *m.a.* as a reserve force. If, however, the patient desires to use his eyes at a nearer working point, say 25 cm., he would not be able to do it with his otherwise normal 9 *m.a.*, because only having a working capital of 3 *m.a.* he lacks 1 *m.a.* of the four needed for the distance,

1m.

i. e., --

4

To sum up: to determine whether a patient's convergence is or is not sufficient for his needs we first estimate

the number of meter angles corresponding to his usual working distance. Then we ask ourselves whether this amount is less than one-third of the working force required. If not he may work without extrinsic muscular strain. In other words, if we find with asthenopic symptoms, that one-third of the positive convergence is not below the number of meter angles required by the patient's usual working distance then it is highly probable the cause of the asthenopia is outside of the external muscle apparatus.

On the other hand, if the working distance, etc., call for more than one-third of the positive convergence power at the disposal of the patient this disparity will certainly, sooner or later, provoke symptoms of eye-strain. For

1m.

example, a person forced to work at — has in all 6
3

m.a. of convergence, and requires for that purpose a working power of 3 *m.a.* and a reserve of 6 *m.a.*, or 9 *m.a.* in all. He has, however, only 4 *m.a.* (two-thirds of six) in reserve and the balance 2 *m.a.* for work; hence is defective 3—2=1 *m.a.*

The *treatment* of insufficient convergence consists either in furnishing the patient with the required convergence (*i. e.*, with additional meter angles of convergence) or in altering his working distance. The latter requirement is met, theoretically at least, by the prescription of prisms with their apices directed towards the temple—abductor prisms, one may call them. But if prismatic glasses are correct in theory are they of *practical* value?

Landolt further remarks that if one desires to correct the refractive error of a myopic patient it is necessary to give him a glass corresponding to the amount of his ametropia; a minus 1 D. lens would be of no use to a myope with sixteen D. So is it with the correction of anomalies of convergence. "If we decide to order prismatic glasses the lens correcting the ametropia should be combined with the prism but I would advise at first a weak prism—one not fully correcting the convergent error—and then increasing it until full strength is used.

However, it will, he believes, be found (just as he showed the unreliability of decentering lenses for their prismatic effect in this same condition) that the use of prisms in this fashion either produces other symptoms (apparent incursion, coloration of objects, etc.) that are almost as objectionable as the muscular asthenopia itself, or they fail to relieve the asthenopic complaints of the patient.

It is generally the case that the convergence defect is more than one meter angle. In this instance there is little to be gained by resort to purely optical means for its relief; it is better to endeavor radically to increase the convergent power. Apart from rest, attention to the general condition and other hygienic measures—all of which are important and should ever be borne in mind in the conduct of all these cases—*operative measures are the most effective.*

It may be difficult to explain, but tenotomy of an ocular tendon does increase the duction power of its antagonist; and, as we generally desire to decrease divergence and augment convergence, simple tenotomy of one or both external recti would, at first blush, seem to be indicated in insufficiency of convergence. Moreover, as it is a simple procedure, and one more easily carried out than advancement, it appeals to many surgeons. However, Landolt's experience shows that, in addition to the danger of producing diplopia and other disagreeable consequences of a complete section of one or both abductor tendons, the muscular asthenopia (for which the operations is done) is not always relieved. This untoward result follows, in his opinion, from interference with an important function of the externi—facultative or latent divergence. From these and other reasons he long ago abandoned tenotomy of the externi as a remedy for insufficient convergence in favor of *advancement of one or both interni.* The latter method is a logical procedure and one that infallibly augments convergence without interfering with the almost equally important relative divergence power. In other words it restores or brings about the normal relations of convergence and divergence.

He has demonstrated that a simple advancement of one internal rectus, without tenotomy of an antagonist,

may increase the convergence power from 3 *m.a.* to 20 *m.a.* Thus, a single operation, performed on one eye, is able to change an insufficiency into an excess of convergence.

Strangest result of all (and very important) is that this apparently excessive addition of convergent power does not interfere with the important relative divergence. It is comparable with the well-known fact that in advancement of an *internus* for divergent squint, while it markedly increases convergence, does not limit the temporal excursions of the eyeball.

As to the degree and manner of advancement, when three or six (or more, because one need not be particular in this regard) *m.a.* of additional convergent power are required he always advances the tendon of one *internus* to the corneal margin. For the reason he has just alluded to an apparent excess of operative convergence is not vital in these cases. Moreover, the extrinsic ocular muscles are not rigid bands of tissue to be mathematically measured by a millimeter rule; and one cannot surgically place them here or there as if they were pieces of metal. It must not be forgotten, either, that there are other considerations (tonus, innervation, etc.) besides length and position of an advanced tendon to be considered."

The writer further thinks that in any event the principal clinical fact, *viz.*, that even an excessive result is almost invariably satisfactory, is not followed by additional symptoms and relieves the oculomotor asthenopia just as completely as if by operation a normal balance were secured. When by means of an advancement the patient secures twenty or even more meter angles of convergence he will use of the total amount only the portion required for comfortable near work.

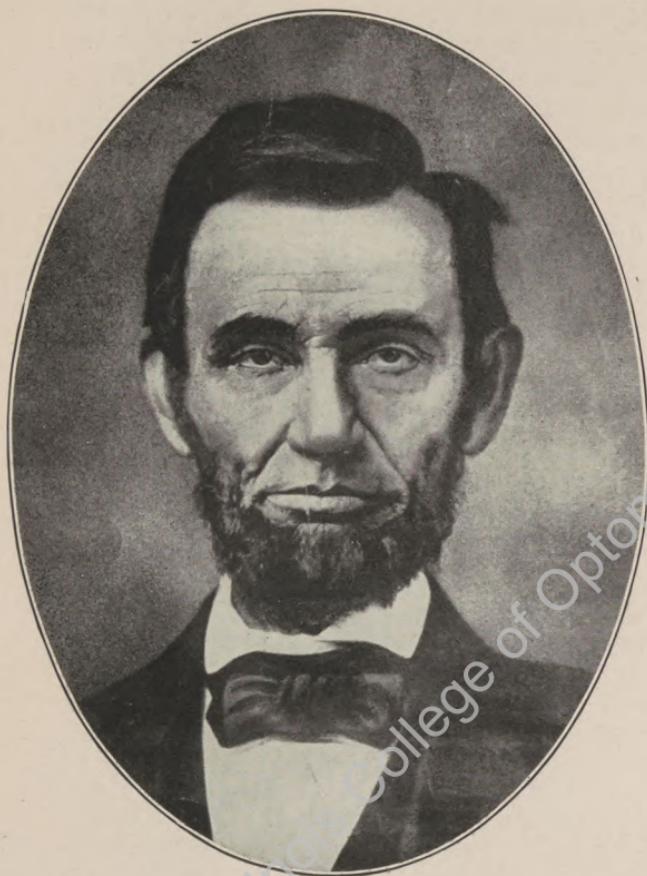
One now and then meets with cases that after operation exhibit a normal or satisfactory convergence but whose muscles assume, after a time, a condition very like that which obtained before the advancement. These are invariably neuropaths—persons with defective motor innervation. In such patients, while a second advancement—of the *internus* tendon of the opposite eye—is indicated, treatment, directed to the general nervous condition, should be instituted in conjunction with the

surgical intervention. Fortunately, such instances are very rare and the surgeon will find that advancement of a single internus tendon will suffice to cure practically all cases of muscular asthenopia dependent on insufficient convergence.

Diagnosis of Heterophoria from a Portrait. S. Mitchell³ gives the following curious and interesting account of Lincoln's heterophoria. "I was," says he, "prompted to write this article by having my attention drawn to a portrait of Lincoln during the recent anniversary celebration of the birth of this illustrious American. While I was examining a fine life-sized portrait, evidently a reproduction from a front-view photograph, I became aware of an effort that I was making to look Mr. Lincoln 'straight in the eye,' when to my amazement, I saw that the gaze was returned by the right eye of the portrait only, while the left eye was directed upward eight or ten degrees. Thinking that the left hyperphoria might be shown in this particular portrait only, I hastened to examine all the portraits that I could find, and discovered that the eyes in all of them presented the same picture of left hyperphoria. I was then forced to conclude that the fault must have existed in the eyes of the great man, and not made so to appear through the fault of any artist. It is fair to presume that the six or eight degrees of left hyperphoria may have been caused by an uncorrected refractive error and the use of the eye, as history informs us that Mr. Lincoln used his eyes, in his early efforts to acquire an education as he pored over his books at night with no better illumination than the flickering uncertain flames of a pine knot fire.

"If the heterophoria can so operate on the nervous system as to change the aptitude of the mind, possibly this small affection of the eyes, that I have had the audacity to diagnose as being present in the eyes of this great man, who died when I was but nine years of age, may have operated to change his life from a rude and reckless Mississippi boatman to the thoughtful, studious lawyer that he afterward became. And thus laid the foundation for the future eminence, which is and always

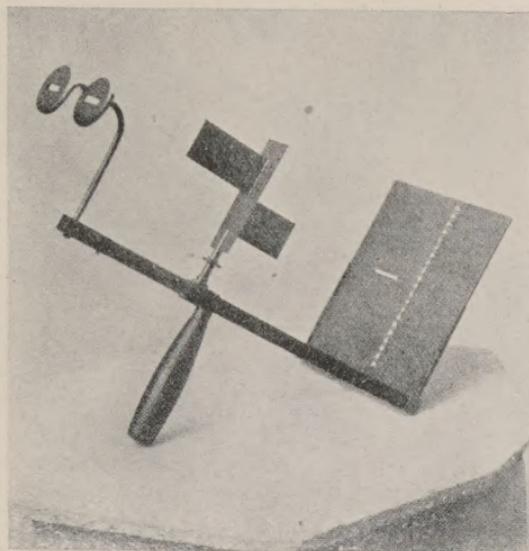
PLATE VI.



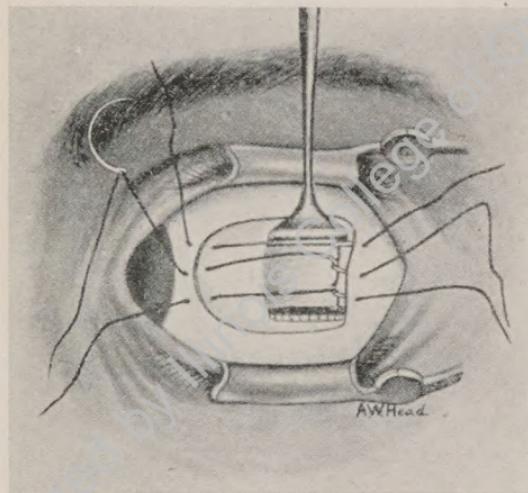
Portrait of Abraham Lincoln showing left hyperphoria.—Mitchell
(see page 104).

Digitized by Illinois College of Optometry

PLATE VII.



a. The Maddox "wing test" for heterophoria.—Holloway (see page 105).



b. Teno-plication.—Worton (see page 106).

Digitized by Illinois College of Optometry

will remain, the admiration and inspiration of the civilized world.

"Chroniclers of the life of Lincoln all speak of the expression of ineffable sorrow frequently seen in his face. One of the most common symptoms observed in those who suffer from heterophoria is the corrugation of the brow and its resulting 'crow-foot,' which does so much to lend the human face an expression of sorrow. The heart-breaking burdens that the Great Emancipator carried during the Civil War were undoubtedly the chief cause of his sorrowful countenance, but a hyperphoria of several degrees would lend its mite to make the marks of sorrow more eloquent and apparent.

"I do not claim to be the first one to discover this great man's only fault, but simply wish to chronicle a matter that accidentally came to my notice, and thereby hear from other ophthalmologists who may have preceded me, but not written about it, in diagnosing Lincoln's heterophoria from his portrait.

"In the accompanying photograph the left hyperphoria is plainly seen. In many of the portraits that I have examined the corrugation of the brow, forming a well-defined 'crow-foot,' was much more discernable than in this picture. Undoubtedly many of these wrinkles were removed by the artists in carefully retouching the negative used to produce the photograph here shown." (See Plate VI.)

The Maddox "Wing Test" for Heterophoria. This instrument, made by S. P. Holloway, of Bournemouth, measures every variety of muscle balance under reading conditions, quickly and accurately. The inventor⁴ claims that it is available even in poor artificial light. It contains no lenses or prisms but the eyes look through two horizontal slits. A line of fine print enables accommodation to be maintained.

For measuring horizontal deviations, it makes use of the well-known tangent scale and arrow. Dissociation of the eye is effected by screening the arrow from one eye and the scale from the other, with horizontal wings. These divide the visual field into upper and lower halves, which glide laterally, so that the arrow in the

(4) *Ophthalmoscope*, p. 342, June, 1914.

lower appears to move, until opposite to that figure in the upper which records the deviation.

For measuring hyperphoria, a similar scale, arranged vertically, is used, and an upright screen divides the field into right and left hand halves.

For amblyopes, a metal arrow, which can be moved by the surgeon until apparently opposite the printed one, makes the reading of figures unnecessary.

For the measurement of cyclophoria, there are stretched across a black surface two white elastic threads, one of which is seen by each eye. These can be adjusted by patient or surgeon until they appear parallel, and the amount of deviation determined from a scale. The threads can be used vertically or horizontally. (See Plate VIIa.)

Teno-Plication. This, as described by the writer, A. S. Worton,⁵ is a method of advancement, without resection of the tendon, for convergent squint. In the words of the author, it may be used in place of the usual advancement operation combined with tenotomy of the internal rectus, but is of special advantage in cases in which it is desired to do an advancement without simultaneous tenotomy of the opponent muscle. No originality is claimed for the idea itself.

The operation is an "open" one and consists of a simple carrying over of the external rectus tendon together with the conjunctiva and capsular tissue and reattachment further forward without tenotomy or resection of the tendon.

The advantage of leaving intact the original insertion of the muscle is specially evident in simple advancement, since in the event of any slipping, or cutting through of the sutures, usually the result of faulty insertion, the muscle can not fully retract as is so likely to happen in the usual method of advancement without tenotomy of the internal rectus owing to the constant traction of the latter muscle.

Provided, however, that the sutures are given a deep hold on the sclera at the new anterior attachment, there is little likelihood of their slipping or cutting through here, and owing to the transverse direction in which the

(5) Ophthalmoscope, p. 326, June, 1914.

sutures are passed through the whole width of the tendon behind, it is practically impossible for them to cut through in this situation. Definite over-correction of the deviation to the extent of from 4° to 5° should be aimed at as the immediate result of operation in those cases in which no simultaneous tenotomy of the internal rectus is done, so as to allow for slight stretching of the new attachment of the muscle.

No over-correction, be it noted, is required when tenotomy of the internal rectus is simultaneously performed on the same eye.

Taking the average length of the external rectus tendon to be about 7 mm., and its scleral attachment about the same distance from the corneal margin, we get a possible shortening of 14 mm. In actual practice the writer has obtained a shortening of 12 mm. From actual measurements of the angle of deviation before and after operation, the writer finds himself in agreement with certain other observers that only 2.5° of correction are to be obtained from each millimeter of shortening, and he now takes the fact as a basis for calculation as to the actual amount of shortening required in a given case.

The effect of the operation is to bury the tendon which becomes adherent to the underlying sclerotic, thus offering a broad area of resistance to the traction of an un-tenotomized internal muscle.

The thin membranous tendon of the external rectus lends itself admirably to this procedure, and the slight hump produced at the site of folding quickly becomes smaller and disappears at the end of a few weeks.

The angle of deviation should be carefully estimated before operation on the tangent scale and the functional condition of the external rectus ascertained. It is obviously unfair to expect a good result from simple advancement in the case of a weak stretched muscle of impaired abduction power.

The best results by this method are to be obtained from squints of the alternating variety with good vision in each eye and normal muscle movements. The only special instrument required is a flat tendon guide with angled handle on which the tendon lies, and which is made in two sizes, 8 mm. and 10 mm. respectively. It

can be used for either eye with equal facility. The larger size is usually employed for adults, the smaller for younger patients, or where there is less room than usual on account of deeply set eyes or other cause. The outer edge is notched in millimeters, and the guide is flanged so that the tendon lies snugly on it, so that it is practically self-retaining during the operation.

The field of operation is constantly under observation—the guide, when in position, preventing any disarrangement of the parts from any unexpected movement of the patient's head or eyes.

Technique: The patient having been prepared in the usual way, the conjunctival sac is washed out with warm boric lotion, a few drops of a 5 per cent. solution of cocaine with 1 to 1000 adrenaline are instilled, and the speculum is inserted.

The operator stands on the right side of the patient's head for the left external rectus muscle, and on the left side of the head in the case of the right external rectus. The conjunctiva is picked up with forceps about 4 mm. from the corneal limbus and reflected precisely as in the usual advancement operation.

The parallel fibers of the external tendon are then defined, and with a snip of the scissors a buttonhole is made through the loose subconjunctival tissue and capsule just above, and then below the margin of the tendon close to its insertion. A tenotomy hook is then passed underneath the tendon and held in the left hand of the operator who then frees, by blunt dissection with the closed scissors, the tendon as far back as necessary to permit of the introduction of the tendon guide. Directly the guide is passed beneath the tendon, the tenotomy hook is withdrawn. An assistant then takes charge of the guide, holding the handle from below in the case of the right muscle, and from above in the case of the left external rectus. This is done to facilitate the passing of the sutures. Three curved needles carrying double threaded No. 1 silk are in readiness, and taking one in a needle holder, the operator picks up the middle of the cut reflected conjunctiva with forceps, and passes the suture through it and then transversely through the tendon, lying on the guide in such a manner that the

middle third of the tendon is included. The emerging thread is passed behind the entering thread of the tendon suture and finally carried forward to the sclera taking a deep hold here and on out through the inner cut edge of conjunctiva. The needle in passing through the tendon is made to impinge directly on the guide to make sure that the whole thickness of the tendon is transfixed. The suture when passed as described is then loosely tied for purposes of easy identification.

The other two sutures for the upper and lower thirds of the tendon are passed in exactly similar fashion, taking conjunctiva, capsular tissue, and tendon, and are then brought forward to the scleral attachment and made to include the cut edge of conjunctiva on the inner side. The sutures being passed, the guide is withdrawn. If it be desired to do a tenotomy of the internal muscle it is done at this stage, otherwise the sutures are tightened, the surgeon bearing in mind the desirability of over-correction of the deviation at the time of operation.

Care must of course be taken that the muscle is not advanced further than the tendon suture will allow, *e. g.*, if the line of tendon sutures is only 4 mm. from the insertion of the muscle the muscle can be reattached only at most 4 mm. in front of the insertion, and so on.

In the combined operation, *i. e.*, with tenotomy of the internal muscle, one further advantage of the method may be pointed out. The patient still has the use of the external rectus muscle, which facilitates tenotomy of the *internus*, and after the tenotomy the exact degree of deviation still uncorrected is evident and can, to some extent, be modified by the amount of the tightening of the external sutures. (See Plate VIIb.)

After withdrawal of the speculum the eye is again washed with boric lotion and bandaged. The writer has not found it necessary to bandage both eyes, even for a limited period.

Daily washing of the conjunctival sac with boric lotion is prescribed and the stitches removed in the simple advancement operation on the twenty-first day, the eye being bandaged for that period. In the combined operation the inner conjunctival suture is removed on the fourth day, the external sutures on the tenth day.

[The tendon guides are made by Messrs. J. Weiss & Son, Oxford St., London, W.]

New Operative Procedures for Shortening and Lengthening Muscles. As pointed out by Roderic O'Connor,⁶ the factors that operate against successful results in all methods of shortening or advancement are: constriction of tissues by the sutures or ligatures employed; tension on the point of union by the operated muscle and its opponent; the anatomic formation of the ocular tendons with fibers parallel and loosely held to-

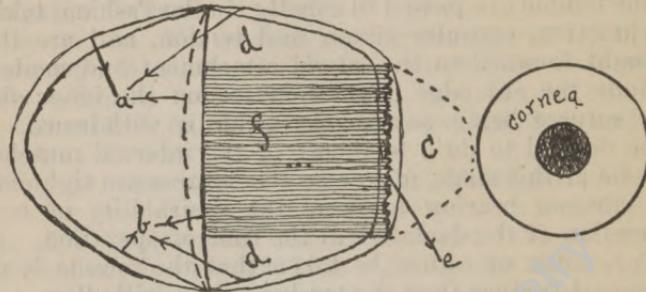


Fig. 12.—Shortening of a Tendon.

- (a) Outlines of conjunctival flap.
- (b) Outlines of flap in capsule of Tenon.
- (c) Area of undermined conjunctiva.
- (d) Sclera-clear view of and easy access to margins of tendon.
- (e) Line of insertion on sclera.
- (f) Tendon.

gether conduced to slipping of the tendon through a suture unless tied tightly enough to cause constriction; stretching of the operated muscle causing paresis.

The steps in the operation devised by the writer are

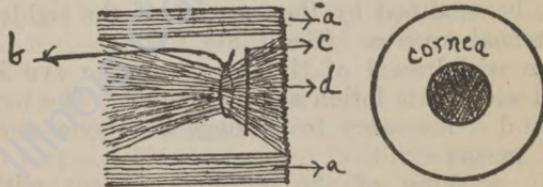


Fig. 13.—Tendon Shortening.

- (a) Tendon strips separated.
- (b) Ligature on central section, one end left long.
- (c) Line of cut across central part.
- (d) Scleral stump of tendon.

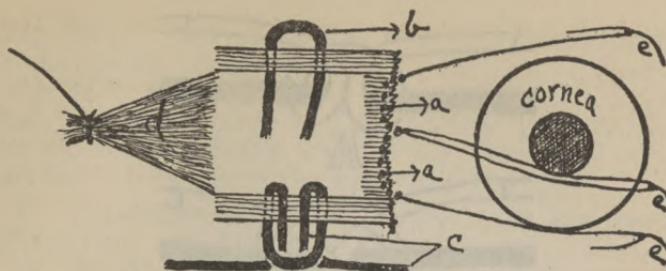


Fig. 14.—Tendon Shortening.

- (a) Suture loops under scleral stump.
- (b) Catgut loop under tendon strip.
- (c) Ends of catgut drawn through loop around tendon strip.
- (d) Central section held back.
- (e) Needles of triple-armed thread.

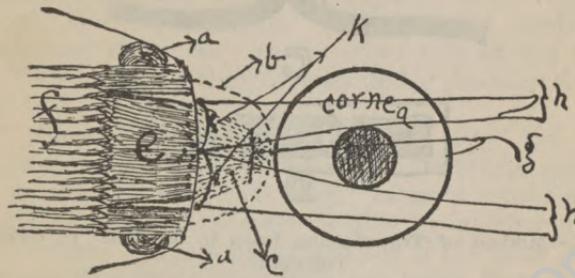


Fig. 15.—Tendon Shortening.

- (a) Bunches in marginal strip made by the shortening.
- (b) Outline of area of undermined conjunctiva.
- (c) Central section drawn under conjunctiva toward cornea.
- (d) Edge of conjunctiva.
- (e) Tendon.
- (f) Muscle.
- (g) End of ligature on central section leading to point of emergence of needle from conjunctiva.
- (h) Ends of two sutures made by cutting the three needles off the triple-armed thread and showing their points of emergence.
- (k) Shows these sutures tied.

as follows: A. Exposure of the tendon: (1) The conjunctival incision is curved, its summit being a little external to the center of the scleral insertion of the muscle; the ends are opposite their respective tendino-muscular junctions and distant therefrom about 3 mm. (2) This flap must be laid well back (Fig. 12-a) as much as possible by blunt separation to avoid hemorrhage. (3) Undermine the conjunctiva toward the cornea (Fig. 12-c) to make a space for the central section of the muscle. (4)

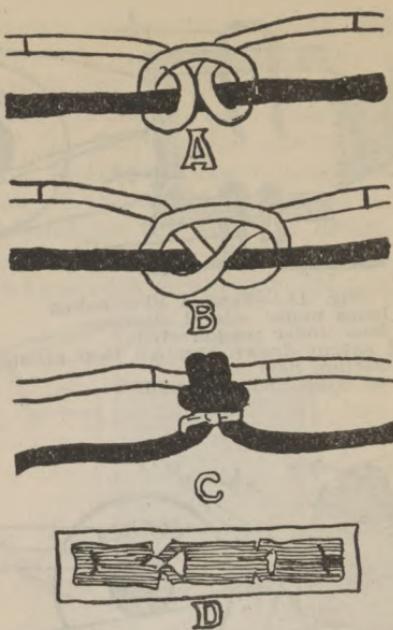


Fig. 16.—Method of Transferring Loop to Tendon. *C*, Graduated Tenotomy.

The incision of the capsule of Tenon follows in a general way that of the conjunctiva and the capsule is laid back (Fig. 12-b) from the surface of the tendon by blunt dissection as far as possible. This separation may be more easily started a couple of mm. back of the insertion where it is freely moveable and not adherent to the tendon as at the insertion. (5) It is important to have the entire tendon in full view in the subsequent steps therefore its margins must be free in their entire length from the insertion of the muscle substance (Fig. 12-d).

B. Tendon splitting: (1) Separate a strip of tendon from each margin about 2 mm. in width and extending from close up to the scleral attachment out to the muscular portion. This must be done bluntly and an iris retractor makes a convenient instrument. It is important to have the tendon strips of practically equal width

(Fig. 13-a). (2) Ligate the remaining central section of the tendon about 3 mm. from the line of insertion (Fig. 13-b) using 00 or 000 plain catgut. Cut one end close leaving the other long for traction purposes later. Cut this central section about 2 mm. from the insertion and lay it back out of the way (Fig. 13-c).

C. Separation of body of muscle from any possible adventitious attachments to the sclera.

D. Passing the suture destined to hold the central of the tendon in its new position. (1) Suture is a number 1 triple armed black silk. (2) Pass center needle through the center of the line of insertion from the scleral side outwards. (3) Pass each end needle in a similar manner but at points opposite their respective ends of the central stump. (4) Lay the needles and threads out of the way on the other side of the cornea. (5) Two loops are thus formed under the scleral stump (Fig. 14-a).

E. Shortening the marginal strips: (1) Use 20 day Lukens catgut because it contains no irritating substance such as chromic acid that might cause a reaction. (2) It must be made completely flexible by soaking in tepid sterile water. This is important for if the least stiffness is present the succeeding steps are made more difficult. (3) Double the strand which should be about 10 inches long and pass the center loop under one marginal strip using a small hook to help draw the loop under the strip (Fig. 14-b). (4) Draw the two ends through the loop (Fig. 14-c) and pull down fairly snugly around the center of the strip, thus making a double half hitch. It is *very important* to have the loop in the center for, if too close to the line of insertion, there may not be enough length of tendon to make the loop on that side. (5) Arrange the ends as shown in Figure 16-a for if crossed as shown in Figure 16-b the next step cannot be accomplished properly. (6) Straighten the catgut by drawing the ends in *opposite directions*, whereupon the double loop will be transferred and now appears in the tendon the gut being straight (Fig. 16-c). (7) The assistant must hold the catgut taut during the succeeding steps. (8) The two tendon loops are slid into *close contact* with each other by pinching with iris forceps. This is *very im-*

portant for it serves to take the slack out of the catgut and thus prevents the re-transfer of the double loop back to the catgut. (9) These loops are held in this close contact by a 00 or 000 catgut ligature (20 day) placed as shown in Figure 16-c (the white knot). It is not tied tightly for it is not intended as a suture but merely to prevent a re-transfer of the double loop. Cut ends close. (10) Cut ends of large catgut as shown in Figure 16-c at the black lines on each side of the loop which shows diagrammatically the appearance of one marginal shortening completed. (11) Shorten the other marginal strip.

F. Suturing the central section in new position: (1) Thread a needle on the ligature and pass it through the undermined conjunctival flap near the cornea and from below outwards. Traction will now draw the tendon forward into this pocket, and it is to be held in this position by an assistant while the holding sutures are being passed. (2) Pass center needle of triple armed thread through the center of tendon from its under side and at a point approximately the same distance back of the insertion as the margins are shortened, thence out through the conjunctival flap about 1 mm. from its edge (Fig. 15-n). (3) Pass other two needles through the conjunctival flap at the proper places and remove the needles, leaving two sutures which are tied (Fig. 15-k) but not so tightly as to cause constriction of the tissues. Cut ends close. The central section is now shortened and held against the original insertion, *this point being free from tension unless the shortening exceeds that of the margins.*

G. Suture conjunctival wound including capsule of Tenon. Usually three or four sutures are necessary.

H. Bandage the one eye for two or three days for protection only.

To repeat—the points essential to success are:

1. A clear field of operation with the entire tendon in view.
2. Placing the catgut loop the proper distance from the insertion.
3. Sliding the tendon loops into close contact and retention in that position by the ligature of fine catgut.

O'Connor further remarks that: "There is no constriction in the marginal shortenings which are by loops not sutures. These loops of tendon constrict the catgut not themselves.

"The suture holding the central section is free from tension—the marginal strands taking the full muscle pull even when in action.

"For these two reasons there can be no loss of effect through the slipping or through cutting and sloughing of sutures.

"Before the catgut can be absorbed the central section is firmly united to the sclera.

"The 'bunch' is not large.

"The effect is necessarily straight forward, therefore no torsion or vertical deviation can follow.

"There is a *definite shortening in the inelastic tendon* equal to twice the circumference of the catgut used plus the length taken up by the overlapping and thickness of the marginal strip.

"The amount of shortening may therefore be varied by (a) the size of catgut, (b) the width of tendon strip.

"The tendon shortening does not, of course, represent the total for the muscle fibers are elastic and must stretch a variable amount depending on the power of the muscle itself and on that of its opponent. *This therefore is the only unknown quantity in this operation.* So far as O'Connor can judge from his fourteen operations the final effect is approximately half the theoretical—understanding of course that in none of his cases have any means been employed to help such as tenotomies, binocular bandaging. It is likely that a much closer approach to the theoretical effect could be secured by the aid of a tenotomy of the opponent. It is his desire to work up the method so as to do away, as far as possible, with tenotomies. However he believes those cases due to actual contracture of a muscle will require a partial or complete tenotomy as the muscle advanced would probably be unable to overcome the contracture of its opponent and would stretch.

"This can be done as an office operation as shown by practically all his cases but especially so by the fourth, which was one requiring a general anesthetic. This is so

because the marginal strands can stand the same strain after operation as before. To determine this positively he operated on a number of muscles of the pig's eye. After shortening a strip he would apply force until rupture occurred and in every case it took place at the tendino-muscular junction and without affecting the point of shortening. If Howe is correct in stating that the *internus* has a lifting power of but one ounce it is clear that by no possibility can the point of shortening be affected by the full normal action of the muscle plus that of its opponent.

"This splint principle can be used in connection with almost any of the present types of operations for: (a) the central section may be resected, tucked or actually advanced by the aid of scleral or other sutures, (b) a central band say 3 mm. wide can be shortened and the lateral sections handled as in Worth's and similar methods.

"If experimental work, which he hopes to carry out in the near future, will show that the marginal shortenings are permanent even after absorption of the catgut then this method can be utilized to correct torsions as follows: (a) one margin can be shortened, the other left untouched, (b) both can be shortened, but one more than the other by using different sizes of catgut, (c) one margin may be tenotomized, the other shortened. This would be the equivalent of Steven's 'extendo-contraction' with the 'contraction' a closer approach to certainty.

"Size of catgut. The number of operations so far are too few to allow of any definite statements along this line. Corrections of 15 degree squints have been secured with number 3 Lukens gut, which measures when dry about 0.75 mm. in diameter; of 20 to 30 degrees with number 4 gut, measuring about 1 mm. Twice the circumference of this last is about 7 mm. and the overlapping of the tendon will probably add 3 more mm. to the effect. He has tried to determine this by shortening a strand of number 2 gut (0.5 mm. in diameter) with another of the same size and found that it shortens 10 mm. It is therefore evident that experience only will settle this point, but it must be remembered that in his cases no tenotomies were done."

Extra-Ocular Tendon Lengthening and Shortening Operations Which Enable the Operator to Regulate the Effect. This is another paper on this subject which deserves to be published at length. It is by Frank C. Todd.⁷

The method of *tenotomy* described herewith does away with the dangers of over-correction that may arise from complete tenotomy, and also the possibility of creating a defect in an opposite place; while it enables the operator to regulate the effect to a greater degree. In any form of tenotomy, however, the ultimate effects can not be accurately determined, because of the contraction that may take place at a later date. The advancement operation, consisting of a tucking of the tendon by the use of a tucker, enables the operator to exactly regulate the effect desired, and securely fastens the tendon, doing away with the dangers existing where the tendon is severed and advanced, that the stitch may cut its way out and produce the effect of a tenotomy.

To insure the best results, it is as important to observe asepsis in performing a muscle operation as is the case in a cataract or any eyeball operation. The everted eyelids should first be flushed freely with a solution of 1 to 5000 bichloride of mercury solution. The adrenaline

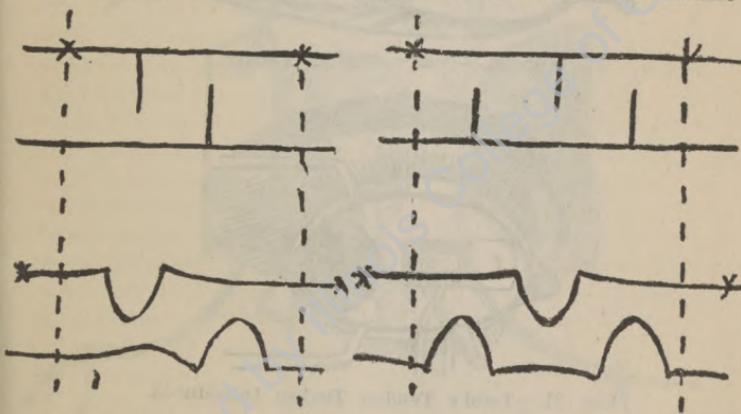


Fig. 17.—The Author's Method of Limited Tenotomy with Two Cuts.

Fig. 18.—The Author's Method of Limited Tenotomy with Three Cuts.

and the 10 per cent. cocaine solution usually employed should be aseptic.

As to the form of tenotomy, if we sever a portion of the tendon on one side, and in another place on the opposite side, situated a short distance longitudinally

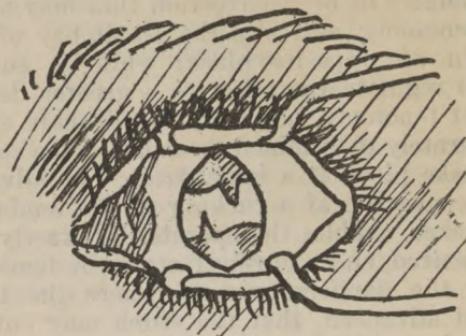


Fig. 19.—Eye Showing Tenotomy.



Fig. 20.—Todd's Tendon Tucker.

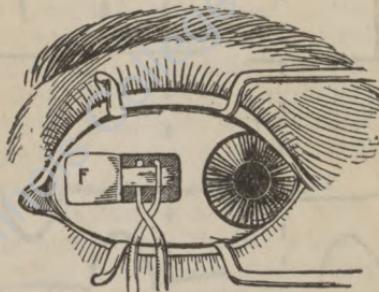


Fig. 21.—Todd's Tendon Tucker Introduced.

from the first incision, sever the remaining fibers, we thereby lengthen the tendon. It is obvious that this means that the tendon must be cut beyond the middle

on either side, and the longer the cut the greater the effect. In operating on a lateral muscle, if complete and full effect is desired, one cut is made from the lower border of the tendon nearly to the edge of the

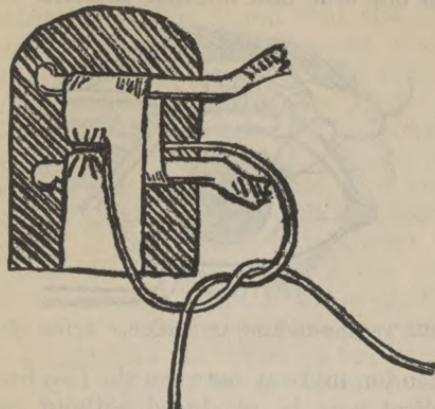


Fig. 22.—Placing of Catgut Ligatures After Tuck Has Been Made.

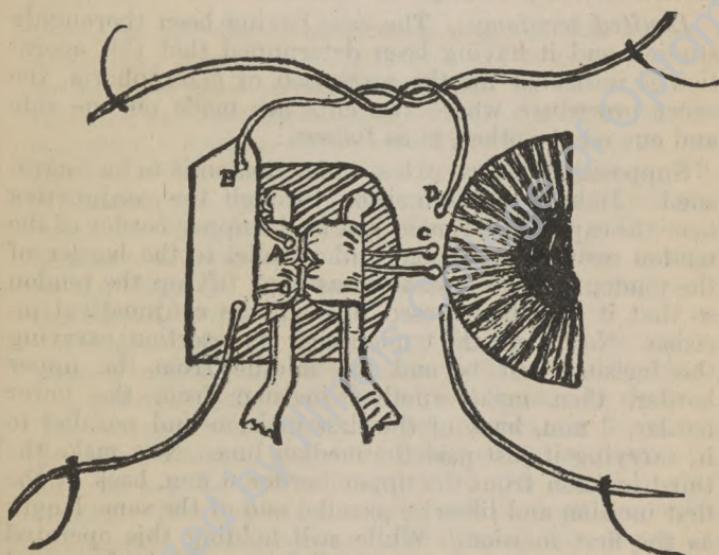


Fig. 23.—Todd's Tendon-tucking Operation. Placing of regulating (or retention) sutures upper one to be tied with a single twist before tucker is removed.

upper border, leaving only a few fibers uncut; another incision is made a short distance from the upper border of the tendon nearly to the lower border of the tendon, leaving only a few fibers there uncut, or if two incisions are made on one side and another incision on the other

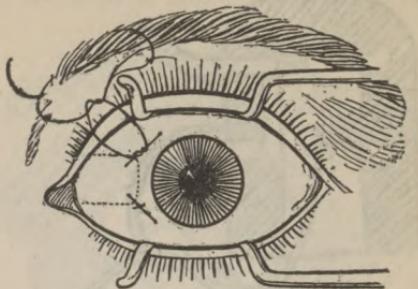


Fig. 24.—Todd's Tendon-tucking Operation. Tying of Silk Sutures.

side of the tendon midway between the two first incisions, a greater effect may be produced without carrying the incision as far as if only two incisions are made.

Limited tenotomy: The case having been thoroughly studied and it having been determined that this operation is indicated for the correction of heterophoria, the exact procedure where two cuts are made on one side and one on the other, is as follows:

Supposing a lateral extra-ocular tendon is to be lengthened. Make a small incision through the conjunctiva near the capsule of Tenon, just at the upper border of the tendon near its insertion, and parallel to the border of the tendon. With a strabismus hook lift up the tendon so that it may be exposed through the conjunctival incision. Now sever the tendon near its insertion, carrying the incision just beyond the middle from the upper border, then make another incision from the lower border, 3 mm. back of the first incision and parallel to it, carrying it just past the median line. Now make the third incision from the upper border 6 mm. back of the first incision and likewise parallel and of the same length as the first incision. While still holding this operated tendon on the hook, pass a small Stevens hook above and below the tendon thus held to hook up any additional

fibers of the tendon which may have been missed, and sever such border fibers. This is important, for if any fibers remain uncut, no effect will be produced by the operation. Now place the patient in front of a phorometer, preferably the Maddox rod, and measure the muscle balance. If it is found that the correction desired has not been secured, the patient should again be put on the table and the incisions in the tendon extended. A second measurement may be then made, and if more effect is required, the incisions may be further extended. Thus the effect may be graduated to the desired amount, measurements being taken between each step which involve lengthening the incisions and increasing the effect. In the case of any deviation it is always necessary to secure an over-effect at the time of the operation, and the greater the error the greater the over-effect required. In the case of a vertical deviation one should be careful not to exaggerate the effect to too great an extent, though the same rule holds true in most cases, that the greater the degree of error the more the over-correction required.

In case the degree of error is so great that both eyes need to be operated on, it is best not to operate on the second eye until permanent results, as determined by repeated measurements, have been produced by the first operation. Such a stable condition will result in from one to two or three months after the operation. Then the second eye may be operated on, and the effect graduated as described above. The operator will usually be able to determine from his experience in the operation on the other eye how much effect should be produced in the second operation.

Tendon tucking: To avoid confusion, and for the purpose of making the description definite, the tucking of a specified muscle, the internal rectus, will be described. The external rectus has been tenotomized, in the manner described above. A flap of conjunctiva is dissected up and turned back, freely exposing the internal rectus tendon. This flap extends from within about 3 mm. from the margin of the cornea back about 6 mm. beyond the insertion of the tendon. The tendon is thoroughly freed of over-lying tissues so that it is bared. A strabismus

hook is now placed under the tendon from above and the tendon is lifted from the globe with the hook to facilitate the introduction of the tucker. The prongs of the tendon tucker (Fig. 18), *being crossed*, that one toward the internal canthus being uppermost, is placed under the tendon (inserting it at the lower border of the tendon) (Fig. 19). The strabismus hook is now removed. The thumb screw at the distal end of the instrument is turned to the right, causing the upper prong to pass toward the cornea over and past the lower prong, carrying with it a fold of the tendon, thus producing the tuck (Fig. 20). The amount of folding depends on the degree of advancement required and the resistance of the tendon. It is well to scratch the tendon gently on the inside of the fold the better to promote union. A needle armed with chromicized catgut (Van Horn's 0 to 00) and so threaded that the catgut will be double, is passed through the center of the two layers of folded tendon near the prong situated most distant from the corneal margin. This double thread is now cut near the needle, thereby creating two threads, one of which is now tied around the upper half of the tendon fibers at the upper margin (Fig. 20), and the other is tied around the lower half; thus two bundles of fibers are produced.

Now pierce the upper bundle of fibers from under the folded tendon, just back of the already tied catgut ligature (Fig. 21A)—an assistant may tilt up the prong near the cornea to facilitate the introduction of this suture—then bring the suture through the upper portion of conjunctival flap (Fig. 21B). Now introduce the needle that is on the end of the suture which emerges from under the tendon into the episcleral tissues very near the margin of the cornea (Fig. 21C), and just above the median plane of the eyeball, and bring it out about 3 mm. above the point of entrance (Fig. 21D). Pass another similarly double-armed suture just back of the lower catgut ligature from under the folded tendon and through the lower margin of the conjunctival flap, and similarly pass the suture into the episcleral tissue from above downwards near the margin of the cornea, and just below the upper silk suture. (It is easier and as well to insert the lower suture into the episcleral tissues later, after the tucker

has been removed.) The upper silk suture may now be tied with a single double twisted knot (not a hard knot). This will bring the conjunctival flap back into place and hold the folded tendon in its new position. Now loosen the tendon tucker by turning the thumb screw at the distal end toward the left, when the tucker may be gently pulled out. If there is resistance, a strabismus hook placed between the prongs against the lower margin of the tendon will readily permit the tucker to come away. The lower suture is now similarly tied with a single double twisted knot (not a hard knot). The pressure on the eyeball which has been exerted by the tendon tucker disturbs for the time being the exact position of the eyeball; it now having been removed, the two eyes may be compared and the silk sutures which have only been tied with a single knot may now be tightened or loosened as is required to produce the desired effect. If the operator has made a correct estimate as to the amount of tucking required before inserting the catgut sutures, an accurate adjustment is now possible by the regulation that is permitted while tying the silk sutures. It is often desirable not to tie hard knots at this stage, but instead to make a bow knot of each suture, bringing the ends out at the internal canthus and fastening them there with a narrow strip of gauze which may be stuck down on the nose with collodion; but if the operator feels that the effect is just what is to be desired the two hard knots may be tied.

The silk sutures will not slip or cut along the fibers of the tendon as the pull is exerted against the catgut ligatures, and they are not liable to cut the scleral tissue, if they have been securely inserted and have included a sufficient amount of episcleral tissue, since they are located near the margin of the cornea and vertically placed. This method of inserting the sutures into the sclera divides the load of the pull and hence is far less liable to cut than where the sutures are inserted horizontally. It will be observed that these regulating silk sutures also serve to stitch the conjunctival flap into place.

It is desirable in nearly all cases to secure a little over-correction, and if a bow knot is used, two days later the

knot may be tightened or loosened, as may be required to produce the correct adjustment, and a hard knot tied.

The eye should be kept bandaged for a week, changing the dressing every day or two. The silk sutures should not be removed until they are loose and evidently of no service. Usually they are not removed until eleven days or two weeks after the operation. If, however, too much over-correction is manifest, they may be removed as early as such a mistake is evident.

At the expiration of eight or ten days, the writer expects to find the eyes perfectly straight, as the condition present at this time is apt to be permanent. If there is over-correction, he removes the silk sutures, and if over-correction remains after their removal, the attachment should be loosened still further with a strabismus hook or scissors. This should not be necessary, but may occasionally occur, especially in the case of an inexperienced operator.

It is preferable to use cocaine anesthesia, as general anesthesia disturbs the physiologic balance, for instance, even in a case of convergent strabismus the eyes may diverge when the patient is asleep. If, however, it is necessary to use general anesthesia, the bow-knot sutures should be used, and the exact regulation can be made several days later.

Following the tucking operation there is left a swelling on account of the folded tendon. This swelling always eventually disappears, but in some cases it lasts for a month and rarely for two or three months. Should the operator so desire, the folded end of the tendon after the sutures have been applied may be cut.

The advantages of the tucking operation over other forms of advancement operations, as given by Savage, are:

"First, it is easier of accomplishment; second, its plane of rotation is less likely to be changed when there is no indication for changing it; third, the stitch is not so likely to cut its way out, and if it does so, or if the knot should become untied, the case would be no worse than before operation; whereas, if either of these accidents should happen to an advancement, before adhesion

has formed, the recession of the muscle might be farther back than its original attachment."

In addition to these advantages, the following may be added:

1. Exactness. Careful adjustment of the position of the eye may be secured at the time of the operation when tying the silk sutures after the tuck has been taken. (*In nearly all advancement operations the operator is obliged to estimate the amount of the effect desired and does not know until his operation has been completed the exact amount of effect that has been produced.*)

2. Security. When the operation is completed the stitches will not cut along the fibers of the tendon because of the catgut ligatures, and they are not apt to cut in the sclera if carefully inserted.

3. Ease. The operation is easier of performance because of the use of the tucker. It is very difficult to make a tuck in a tendon, especially if much effect is to be produced, without the use of some instrument to simplify the procedure.

4. Flexibility. A low degree of effect may be produced, or as high as 40 degrees of strabismus corrected by means of this operation.

5. Strabismus of very high degree may be corrected by operating on one eye.

Treatment of the Phorias. In an instructive paper on this important subject G. C. Savage⁸ remarks that

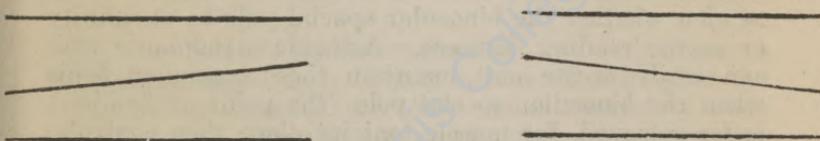


Fig. 25. (a) Left + Cyclophoria. (b) Right + Cyclophoria.

errors of refraction should always be corrected in cases of *orthophoria*. If the eyes should then cause trouble, the *orthophoria* certainly belongs to the asthenic type, which might have been determined at the first examina-

(8) Ophthal. Rec., November, 1914.

tion. Orthophoria with abduction of eight degrees or more, and sub- and super-duction of three degrees or more, is sthenic and will need no attention. An orthophoria with abduction of six degrees or less, and sub- and super-duction of two degrees or less, is asthenic and should be treated by ceiling-to-floor and wall-to-wall exercise. If abduction is low, but sub-duction and super-duction are normal, the treatment must be wall-to-wall exercise. If the abduction is normal and sub-duction and super-duction are low, the treatment must be ceiling-to-floor exercise. These exercises should be practiced daily,

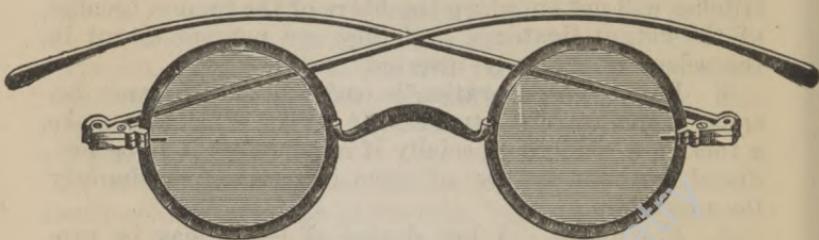


Fig. 26. Exercise Frames for Superior Obliques.

always rhythmically and short of fatigue, until the duction power of the weak muscles has been brought up to the normal.

Sthenic orthophoric eyes can easily create and maintain the binocular field of vision and the binocular field of view whether the binocular spacial pole be at infinity or at the reading distance. Asthenic orthophoric eyes can easily create and maintain these binocular fields when the binocular special pole (the point of fixation) is far removed, for muscle tonicity alone then controls; but, when the binocular spacial pole is nearby, these fields are maintained but at the cost of muscle fatigue, coming from muscle activity. The reason for the exercise treatment of asthenic orthophoria must be clear.

Pseudo-Esophoria: That caused by hyperopia, is curable by the spherical lenses which fully correct the hyperopia. The pseudo-esophoria caused by weak ciliary

muscles, shown only in the near, is curable by means of minus spheres (.50 to 1.00 D), used for rhythmically exercising these muscles. Orthophoria in the far and esophoria in the near test always means weak ciliary muscles. In making these muscles strong by exercise, or rendering them a certain amount of assistance in their weakness by means of plus lenses for near use, though there may be neither hyperopia or presbyopia, each will correct the pseudo-esophoria. The exercise lenses are far preferable to the rest lenses. Pseudo-esophoria makes the same demand of the right and left fourth basal or fusion centers as does intrinsic esophoria, and the demand for treatment is just as urgent.

Intrinsic Esophoria: This is readily distinguishable from pseudo-esophoria, and it demands treatment that

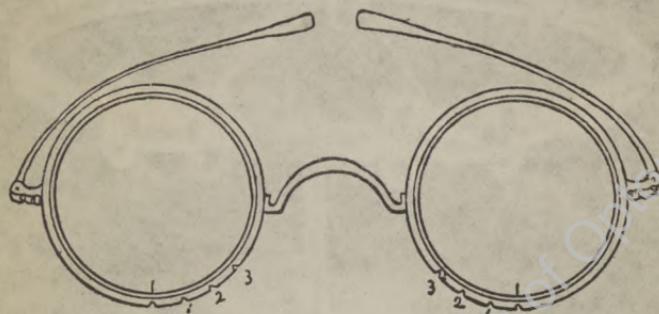


Fig. 27. Exercise Frames for Inferior Obliques.

relief may come to the externi and the two fusion centers controlling them. It is only by means of activity on the part of these muscles and their fusion centers in cases of untreated intrinsic esophoria, that the binocular spacial pole can be created and maintained. The quantity and kind of esophoria determine the character of treatment. Low grades of either sthenic or asthenic esophoria may be cured by rhythmic prism-exercise of the externi. Developing the externi gives them increased tonicity for balancing the formerly too strong interni, thus allowing the right and left fourth fusion centers to

have the rest which is theirs in natural lateral orthophoria. Only rhythmic exercise, short of fatigue and not repeated too often, will build an ocular muscle. These lighter cases of esophoria can be treated by prisms in position of rest for the externi—bases out. They should

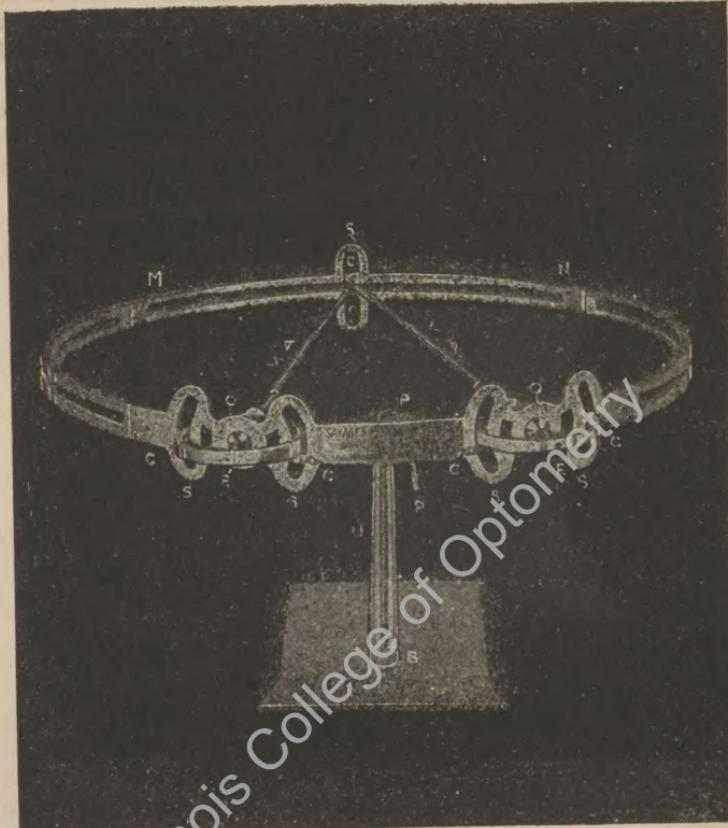


Fig. 29. Savage's Muscle Indicator.

not be strong for the reason that any prism destroys the binocular spacial pole, interferes with the law of visible direction, and disturbs orientation. The stronger the prism, the greater the disturbance.

In the higher degrees of intrinsic esophoria nothing can be accomplished by either exercise of, or rest prisms

for, the *externi*, hence relief must come as the result of operations. In asthenic esophoria, best determined by the low abduction found, the weak *externi* should be shortened, so that the orthophoria obtained may be of the sthenic variety. To weaken the *interni* by partial tenotomies, in such cases, would establish an orthophoria of the asthenic kind. The shortening of the *externi*, in such cases, would easily create the binocular spacial pole both in the distance and nearby; while the tenotomies would make easy the creation of the distant binocular spacial pole, but the eyes could not easily maintain the binocular pole in the near.

In sthenic esophoria, also best determined by finding abduction normal, or only slightly subnormal, the operations should be partial tenotomies of the *interni*. In some of these cases the esophoria may be so great as to require a shortening of the *externi* in connection with the partial tenotomies of the *interni*. In no case should the tenotomy of the *interni* be complete, nor should the *externi* be advanced—partial tenotomies and shortenings or tuckings, one or both, are all-sufficient. Straight-forward shortenings of the weak muscles, and central tenotomies of the too strong muscles, must be done unless there is a complicating cyclophoria. The purpose of every kind of treatment of esophoria is the production of sthenic orthophoria, which means that any complicating error of the superior or inferior recti and of the obliques must be treated at the same time. Orthophoria of all the recti muscles is essential to the easy creation of the binocular spacial poles and parallels, while orthophoria of the obliques is essential to the easy creation of the binocular spacial meridians. All of these muscles, when orthophoric, accomplish, with the greatest ease, the creation of the binocular fields of vision and view. This is done by tonicity only when the binocular pole is at practical infinity, which implies that they can easily maintain the binocular field whatever may be the distance of the binocular pole.

Pseudo-exophoria: This can exist only in the near and should be treated without operation. If its cause is myopia, its cure is concave lenses to be worn in all near work for the correction of the exophoria. Myopes are

all too prone to take off their lenses in near work. Exophoria in the near, when the eyes are emmetropic or even hyperopic, in excess of an exophoria in the far, or when there is distant orthophoria or even esophoria, can hardly be classed as a pseudo-exophoria; but certainly it can not be classed as an intrinsic exophoria. Hyperdeveloped ciliary muscles may often be charged with the production of this form of exophoria. Such muscles requiring but a small impulse from the tenth conjugate center to the ciliary muscles, for focusing rays of light, cause but a small discharge of neuricity from the third conjugate (convergence) center, which must be supplemented by a sufficient discharge from the right and left third fusion centers to produce full convergence. The hyperdevelopment of the two interni, in harmony with the hyperdeveloped ciliary muscles, is essential, in order that the associated small impulse from the third conjugate center may be able alone to accomplish correct convergence. This can be done by the candle exercise method. Whatever may be the cause of this want of converging power, the curative treatment is the candle-exercise, always short of fatigue and not too often repeated. Shortening of the interni would make them respond more readily to the small associated impulse, but this ought not to be done unless faithful and long-continued candle-exercise has failed. Prism exercise of convergence is better than no exercise at all, and is preferable to operative interference. Deficiency of convergence is one of the most common forms of heterophoria, and it can not be ignored. Lenses for near use, in young people, can not be satisfactorily prescribed without a knowledge of exophoria in the near, and of all other forms of lateral heterophoria.

Intrinsic Exophoria: This shows itself in both the far and the near tests, and if there is not a complicating pseudo-heterophoria, the measurements will be the same at these two points. This error may be sthenic or asthenic, and it may be of high or low degree. Prismatic exercise of the interni, rhythmic in character, not too severe, and not too long continued, will cure the slighter cases of either sthenic or asthenic exophoria. The candle-exercise is not indicated in these cases. If the worth

of the method of prism-exercise of the interni were fully appreciated by the oculist and the patient, there would be greater persistency in its use, and splendid results would follow in many cases. The purpose of the exercise is to increase the tonicity of the interni, so that the right and left third fusion centers may be relieved of abnormal work, at all distances, which would mean that the interni would be relieved of abnormal contractility.

Operations alone can cure the higher degrees of exophoria, whether sthenic or asthenic. The true nature of the case, which can be determined by the abduction test, determines which muscle shall be operated on, and the kind of operation that should be done. The case that shows eight degrees or less of abduction is asthenic, and would be made worse by partial tenotomies of the externi. Shortening of both interni alone should be done. This would increase the tonicity of the interni which means that there would still be some hyperphoria of the eye operated on, which should be relieved by a central tenotomy of its inferior rectus. Usually these two operations will accomplish the desired results—vertical orthophoria. Should there still remain some vertical imbalance, the final operation should be a shortening of the inferior rectus of the hyperphoric eye. There should be an interval of a month or more between these several operations.

Most cases of hyperphoria and cataphoria belong to the sthenic class as can be shown by high super-duction of the one eye and sub-duction of the other. Should the case be asthenic, as shown by low duction power of the stronger muscles, the whole correction should be attempted by a shortening of the inferior rectus of the hyperphoric eye.

The treatment, other than by rest prisms, has for its object the procuring of sthenic vertical orthophoria, so that the first basal center on one side (cataphoric) and the second basal center on the other side (hyperphoric) may be relieved of abnormal work in the creation and maintenance of the binocular spacial pole and fields.

Adduction has not been mentioned as a means of determining the sthenic or asthenic nature of either orthophoria, esophoria or exophoria, for the reason that it is

too variable for reliability. The verting test, which can be made with the Stevens tropometer or with the ordinary perimeter is more interesting than it is indicative of the proper line of procedure in the treatment of any condition of the recti muscles. Eyes that are sthenically orthophoric, as shown by abduction, sub- and super-duction, will have full verting power. Every procedure outlined above, based on the duction test, looks toward the production of sthenic orthophoria which guarantees full verting power.

Cyclophoria is that condition of the obliques, as to tonicity, which makes the creation and maintenance of the binocular spacial meridians difficult, and yet they must accomplish this task.

To show the existence of cyclophoria the same principle is involved as in the test of the recti muscles for imbalance; that is, the image of the test line in the one eye should be thrown entirely outside the boundary of the fusion area. In this the cyclophorometer has the advantage over the clinoscope, though with either instrument the error may be detected and measured. The error was first discovered by means of a double prism, each six degrees, bases in contact, before one eye, the test object being a horizontal line. The axis of the double prism being vertical it was so held as to double the line for that eye, the two lines of necessity being parallel. The other eye saw a third line between these two which should have been parallel with them. In the case in which the discovery was made, the middle line dipped toward the opposite side, as shown in the figures, which is the first illustration ever used for showing loss of parallelism between the vertical axis of the eye under test with the median plane of the head.

If the middle line in the figure had been seen by the right eye, the condition would be minus cyclophoria; and if the middle line in the next figure had been seen by the left eye, it would have shown minus cyclophoria for that eye. The false line leaning towards the opposite side always means plus cyclophoria, while leaning towards the same side always means minus cyclophoria. In the former case the vertical axes have a tendency to diverge from the median plane of the head, while in the

latter they have the tendency to converge towards this plane. To prevent this loss of parallelism between the vertical axes and the median plane of the head the right and left sixth and seventh fusion centers, as the case may be, send neuricity to their individual oblique muscles, compelling them into contraction to supplement their tonicity. The right and left sixth basal centers are the active ones in plus cyclophoria, while the right and left seventh basal centers are the active ones in minus cyclophoria.

Cyclophoria is intrinsic. It may exist in connection with compensating cyclotropia which is always found in nonparallel oblique astigmatics. In such a case the divergence or convergence of the meridians of greatest curvature will determine whether or not the correcting cylinders will bring relief from the cyclophoria. If there is plus cyclophoria (fifty times more common than minus cyclophoria) and the astigmatism has its meridians of greatest curvature diverging above, the correcting cylinders will bring great relief but will not cure; if these meridians converge above, the correcting cylinders will make the patient worse and to such an extent that she may not be able to wear the lenses. The reverse in all respects is true of a case of minus cyclophoria.

The weak obliques can have their tonicity augmented by rhythmic exercise. The production and destruction of artificial oblique astigmatism, rhythmically and not continued too long constitute the method of this exercise, while a pair of weak plus or minus cylinders set in circular rims so that they might be revolved in the arcs of distortion for the obliques to be exercised. The illustration shows the frames containing plus cylinders for the exercise of the superior obliques.

In the illustration the axes of the cylinders are at 90°. The notches shown in the lower temporal quadrants are graduated stopping places for the axes as they are being turned from 90° towards 45° for the right, and 135° for the left. The test object should be a white horizontal line on a black-board, or horizontal slot brightly illuminated. The strength of the cylinder should be + .50 D to + 1.50 D, rarely stronger. With their axes at 90° there is no distortion of images, hence no action

of the superior obliques. Moving the axes to the notches marked 1, there is slight distortion, and correspondingly slight action of the superior obliques, when the cylinders are before the eyes. Raising the frames the obliques lapse into rest. The rhythmic lowering and raising of the frames at intervals of three seconds, promptly causes contraction and relaxation of the weak superior obliques. At the end of five minutes the axes should be turned to notches marked 2. There is greater distortion here, hence increased work on the part of the superior obliques. The rhythmic lowering and raising of the frames should now be continued three minutes. Lastly the axes of the cylinders should be placed at the notches marked 3. They now produce the maximum of distortion and command the maximum action of the obliques. The rhythmic lowering and raising of the frames should now be continued only two minutes. A shorter time at first might be necessary because of fatigue. A longer period of exercise, at any time, might be hurtful. The rule here should be rhythmic contraction and relaxation, short of fatigue, as set forth in the study of exercise of the recti.

The next figure represents the frames prepared for the exercise of weak inferior obliques, plus cylinders being used for the purpose.

If minus cylinders should be preferred, the frames shown in the former figure would be for the exercise of the inferior obliques, and the frames shown in the other cut would be for the superior obliques.

Both plus and minus cyclophoria can be cured by exercise. Progress is necessarily so slow that patients often fail to carry out the treatment, although it could be done at the home, without loss of time in waiting at the office.

Weak cylinders, plus or minus, can be given to nonastigmatic cyclophorics, with their axes so placed as to rest insufficient oblique muscles. They produce artificial astigmatism to which there are two objections: (1) images are rendered less sharp while being distorted; (2) the compensating cyclotropia interferes with correct orientation. If rest cylinders are given their strength should be .50 and their axes should be placed in the arc of distortion for the stronger obliques. If there is plus

cyclophoria, and + .50 cylinders are used, the axis of the right should be at 135° and that of the left at 45° ; but if minus .50 cylinders are to be used for resting the weak superior obliques, the axis of the right should be at 45° and that of the left at 135° . All this is reversed if there is minus cyclophoria. Rest cylinders for weak oblique muscles are a little less scientific than rest prisms for weak recti muscles.

Plus cylinders correcting a natural astigmatism can be slightly revolved, so as to interfere but little with the sharpness of retinal images and yet bring considerable, if not entire, relief from the cyclophoria. A wrong revolving would augment both the cyclophoria and the symptoms. If the cylinders are plus and their axes are diverging, they should be made to diverge more (2° to 5°) in plus cyclophoria, and should diverge less in minus cyclophoria; but if the plus cylinders have their axes converging, they should be made to converge less (2° to 5°) in plus cyclophoria, and should converge more in minus cyclophoria. If correcting cylinders are minus, the reverse of the above changes would be correct. This is the rule first formulated by N. C. Steele. The exceptions to the above rule apply when the axes of plus or minus cylinders are in the horizontal or somewhere between the horizontal and 45° above or below. The following is a universal rule for shifting axes of cylinders to help weak superior oblique muscles in plus cyclophoria:—The axes of plus cylinders in the upper half of the upper temporal quadrant, and the axes of plus cylinders in the lower half of the upper temporal quadrant should be shifted towards the central point of that quadrant; the axes of plus cylinders in the upper half of the upper nasal quadrant and in the lower half of the upper nasal quadrant should be shifted from the central point of that quadrant. In minus cyclophoria the very reverse would be the order of shifting.

In both plus and minus cyclophoria, when the correcting cylinders are minus, the reverse order of shifting for each condition must be observed.

In cases of esophoria, exophoria, or hyperphoria and cataphoria, to be operated on, any complicating cyclophoria may be cured by either the partial tenotomies or

the shortenings or tuckings to be done. One single illustration must serve to show my meaning. A case of sthenic esophoria with hyperphoria of the right eye and cataphoria of the left, complicated by a known degree of plus cyclophoria. The first operation should be a partial tenotomy of the left internus including all the lower and central fibers. This would lessen the esophoria, would correct in part the cataphoria and most likely would correct the whole of the plus cyclophoria. The cyclophoria having been cured, any further tenotomies must be central. If all the plus cyclophoria has not been corrected and there yet remains some slight hyperphoria, the next operation should be a nasal-marginal-central tenotomy of the right superior rectus. Whether the second operation has or has not corrected the hyperphoria and the plus cyclophoria, an operation on the right internus for the remaining esophoria must be a central, partial tenotomy. It is easy to know when, and when not, to do a marginal tenotomy or a marginal shortening in any given case. Without a complicating cyclophoria all tenotomies should be central and all shortenings or tuckings should be straightforward. When there is a complicating cyclophoria, certain tenotomies should be central and others ought to be marginal.

TOXIC AMBLYOPIA.

Optic Atrophy Following Wood Alcohol Poisoning. Samuel S. Quittner⁹ reports unusual symptoms in one of these unfortunate cases. The poisoning occurred in a male patient, 61 years of age. He denied ever having syphilis; has had gonorrhea twice; was a heavy drinker for years, but in the past two years states he drank practically very little--in fact, has not been intoxicated during this period.

On July 4, 1914, he went to a paint shop for a pint of wood alcohol. He and another friend then imbibed its inviting contents, his friend consuming but very little (a small glass, as he states), and he draining the rest. The alcohol was taken diluted with water. The patient then stated that after taking but very little (although

(9) Cleveland Med. Jour., November, 1914.

during the course of the day he consumed the remainder of the pint) he "went out of his head" and remained that way for three days. At no time, he stated, was he wildly maniacal or had to be strapped down. On July 8—four days later—he suddenly went blind and saw absolutely nothing (not even daylight). For a period of two weeks he remained this way and then the sight gradually returned so that he was able to go about. During this period he went to no physician about this important event and it was not until September 9 (when Quittner saw him) that he considered it a matter worth consideration.

The vision at his first visit was: O. D.—Fingers at two feet; O. S.—Fingers at one foot. The eye-grounds showed a picture of optic atrophy fairly well advanced, the nerve head paler to a marked degree, and some of the vessels contracted, especially the disk.

The perimeter readings showed a contracted field in a regular manner of about half the normal, the contraction being greater on the temporal side. Both eyes approximately showed a reading on the temporal side from 35-40 degrees—below about 50 degrees; above 30-35 degrees, and on the nasal side 35-40 degrees.

The patient failed to recognize red or green in any quantity, recognized blue when a large piece of yarn was presented, but failed to recognize it in a small amount.

He stated that he saw best toward evening—nyctalopia. He always wore blue glasses, appreciating himself the benefit of reducing the dazzling of daylight.

The patient was placed on 1/30 grain of strychnine sulphate three times a day, and later the dose was increased to 1/15 grain twice a day. On a later examination he showed an improvement in sight, the right eye now recognizing fingers at from 5 to 6 feet and the left eye at from 1 1/2 to 2 feet.

The interesting features in this case are the sudden and acute onset of the trouble, with complete blindness, and the early picture of optic atrophy. Ordinarily one would not expect a complete blindness, or (if the pathology of the condition is accepted of a neuritis in the retrobulbar region) a picture so early of atrophy with the perimeter finding of a contracted field. Ordinarily the

limits of the field remain normal, with a central scotoma due to the maculo-papular bundle being first involved. Did the original lesion consist of acute poisoning of the retinal filaments of the ganglion cells, with a subsequent ascending degeneration of the fibers, or was it a retrobulbar neuritis with a descending degeneration? As for the first supposition, it seems the sudden and complete cessation of sight would speak in its favor, for it showed a profound toxemia in these elements. Such an argument is offered in like cases when due to poisoning with quinine. As for the second supposition, the early picture of advanced atrophy of the nerve-head would speak in its favor, for there may have been some papillitis (due to an extreme swelling in the retrobulbar region of the nerve), which at the time of the first examination had subsided and thus explained this early picture.

[The need of enforcing the laws against the promiscuous sale, especially by retail druggists, of such poisons as wood alcohol is abundantly proven. A short time ago the Editor was able to buy in the largest and otherwise well conducted drug stores of Chicago pint bottles of the so-called Columbian Spirits (deodorized wood alcohol) without a question being asked and without a poison label on the package. So long as a supine public are willing to be killed and blinded by this agent and as long as the Government permits the retailer to sell over the counter to anybody who asks for it such lethal agents as "deodorized" wood alcohol, just so long will the annual crop of deaths and incurable blindness be reaped by the manufacturing concerns who "refine" this poison and sell it to druggists and paint dealers. Meantime it behooves members of the medical profession, by every means in their power, to encourage the use of "denatured" alcohol, a cheap, harmless and effective substitute for both the expensive grain alcohol and the cheap but poisonous Columbian Spirits.—ED.]

GLAUCOMA.

Anatomic Investigation of Operation Wounds and of Decreased Excavation of the Papilla After Successful Glaucoma Operation. Holth, of Christiania, in addi-

tion to reading a paper upon the results of his operations for glaucoma at the Heidelberg Congress in August, 1913, gave an interesting demonstration of a series of microscopic sections he had obtained from patients upon whom he had operated. T. Harrison Butler¹ has reviewed the article in question, from which the Editor has borrowed the accompanying illustrations whose legends furnish almost a sufficient explanation. (See Plate VIII.)

Four eyes, taken from two patients, who died after the operation had been performed from the material of Holth's Demonstration.

Importance of Precise Determination of Ocular Filtration. The salient points in the pathogenesis of glaucoma are detailed by John T. Shoemaker.² He believes that the estimation of the rate and amount of ocular filtration by means of the tonometer should be as much a part of the routine work of the ophthalmologist as is the employment of this instrument for the measurement of ocular tension. The normal average index of filtration presumably exists, but in order to establish its limits, investigation is necessary in a large series of normal eyes. In glaucomatous eyes increased tension, as discovered by the tonometer, is invaluable assisted with lessened or delayed filtration, but a disturbance of drainage may exist, as an important indication of incipient glaucoma, with a tension well within the usual normal limit of 25 millimeters. Delayed or deficient filtration (the most important premonitory symptom of incipient glaucoma) should warn the surgeon, in spite of the absence of characteristic symptoms of glaucoma, of the probability of a subsequent attack of this disease. Further investigation is urgently needed to determine the effect on ocular filtration, of the valuable operations proposed for the relief of glaucoma, which shall be found to influence filtration most effectively and which will eventually become the "operation of choice" in this serious disease.

Hereditary Glaucoma (Simplex). Observation and studies (including operative notes) of eight glaucomatous individuals of a single family, whose pedigree extends

(1) Ophthalmoscope, March, 1914.
(2) Penn. Med. Jour., January, 1914.

over three generations, are given by Phinizy F. Calhoun.³ He reports similar cases by Lawford and by Lucien Howe, and concludes with the following statements: The sizes of the corneas were within the normal limits; the anterior chambers were of normal depth and the pupillary reactions were sluggish; while the visual fields were not characteristic, there uniformly existed a great confusion of colors; a physiologic cupping was noted as an early symptom in two cases. Many of the irides were of light color, a fact of no importance. The earliest symptom was a diminution of vision of one eye. Miotics were always useful and even after operations they aided in the reduction of tension. The tonometer is a most valuable and necessary instrument in noting the progress of the disease, as much as the clinical thermometer in any febrile condition. The operation of choice in Calhoun's hands, the one that maintains low intra-ocular tension, is the scleral trephine after the manner of Elliot. The cause of this form of glaucoma as well as the part that heredity plays is still unknown. While, unfortunately, no microscopic studies have yet been made, we can reasonably assume that some congenital obliteration or sclerosis exists in the region of Schlemm's canal or changes similar to those which occur in the buphthalmic eye. A sociologic question arises whether the children of a glaucomatous family should marry and become parents.

Sclero-Corneal Trephining for Glaucoma. The literature of this important operation is still as voluminous as it is interesting. R. H. Elliot⁴ refers to the trephining of 135 eyes in the course of a tour in America and a number of cases in England.

Unless there is some reason to the contrary he considers that the upper quadrant is the choice in trephining. In making the conjunctival flap one should avoid the brow with the scissors. The conjunctiva should be seized as high up as possible on the bulb with forceps, and drawn well down, at the same time asking the patient to look strongly downward; one free cut in the direction in which the flap is to be made, followed by a couple of

(3) Jour. Amer. Med. Ass'n., July 18, 1914.

(4) Lancet, March 21, 1914.

snips at each side, will often outline the flap throughout its extent. It is unnecessary, and therefore unsurgical, to dissect up the whole area included in the flap; moreover, by so doing we rob the flap of the check-ligament-like action of the connective tissue at the angles of the wound. If we leave this tissue intact, the detached conjunctiva tends to spring back into place when released from the downward pull, while if we clear the margins of our wound we find that at the end of the operation the flap falls limp and inert over the cornea like a loose apron. As we approach the limbus we should work down to the sclera, and should expose the latter bare in the last few millimeters of the wound. At the same time the breadth of the dissection should contract as we approach the cornea, so that when we reach the latter we only expose just such a breadth of it as we mean to split, and very little more. The area over which we are about to apply the trephine must be carefully cleared of all tags of loose tissue; if this precaution is neglected, the trephine will not bite well, and will tend to shift from its position; moreover, when it does begin to cut, these tags may get caught in the action and tend to draw the flap into the wound and damage it. In splitting the cornea the most important point is to work at exactly the right place—*i. e.*, just behind the line of reflection of the flap; a number of short lateral strokes along this line speedily effect our purpose in most cases; if the cuts are made too far forward the flap is at once button-holed, while if they are made too far back the surgeon merely wastes his time in an ineffective scratching of the sclera; the instrument is inclined at an acute angle to the cornea, bearing in mind that what we want to do is to peel off the superficial layers in a thin flap. We must be careful to place the trephine hole as far forward as possible. The amount of pressure must be learned from experience, but with the new and heavier trephines ($\frac{1}{2}$ oz.) no pressure is necessary as the instrument works by its own weight. The direction in which the blade of the trephine is to be held relative to the corneo-scleral surface is a matter of great importance; our object should therefore be to make the blade cut through first on its corneal edge, and in order to ensure this we must slope

its handle-end a little toward the patient's feet; the result will be that as soon as the trephine has cut its way through, the disc, hinged on its scleral side, will be pushed upward and backward by a bead of iris tissue, prolapsing through the corneal side of the opening. An iridectomy should be made, as a routine step, in every trephining operation, simply to avoid the risk of iridic tissue becoming impacted in the trephine aperture during convalescence. It is most important that the iris should be thoroughly replaced, and that no uveal tags should be left in the wound: for this purpose we use a small irrigator, and placing the nozzle at the entrance of the trephine hole, we direct a bold stream of aseptic saline solution into the chamber; this easily and quickly washes the iris back into place, always provided that it has not been dragged into the wound and impacted there at an earlier stage of the procedure. His rule is to avoid all instillation immediately after operation unless the pupil shows a tendency towards upward displacement, in which case eserine drops (gr. 4 ad oz. 1) are instilled; on the third day, provided that the tension is down, he drops in a solution of atropine (gr. 4 ad oz. 1) unless the pupil is already widely dilated and active.

A Keratome, Which Facilitates the Elliot Trephining Operation. In the performance of the Elliot operation for glaucoma, dissection of the flap into the cornea, is quickly and safely done by the use of a keratome, which G. B. Jobson⁵ devised for keratotomy in 1912. The flap is made as follows: The conjunctiva is grasped in a ver-



Fig. 29.—Keratome for Splitting Cornea in Sclero-Corneal Trephining.

tical fold, with a pair of toothed forceps, as far above the cornea as possible. The fold of conjunctiva is snipped transversely with a pair of slightly curved Steven's tenotomy scissors. One blade of the scissors is entered in the cut, and the incision is continued downward, first

(5) Ophthal. Rec., May, 1914.

on one side of the cornea, and then on the opposite side, to bisect the ends of an imaginary line 2 millimeters below the upper sclerocorneal junction. The apex of the flap is grasped with forceps, and the conjunctiva separated to the limbus with the points of the scissors, which are turned toward the sclera, so as to prevent button-holing the flap. This flap is turned over the cornea, and dissected with the keratome down to the corneal margin, and the epithelial and outer corneal layers are undermined for about 2 millimeters, being careful not to enter the anterior chamber. This affords sufficient space for the entrance of the trephine, half in the cornea, and half in the limbus. The Beebe binocular loupé is of assistance in making the corneal part of the flap, and trephining; as it magnifies the field considerably.

The Ideal Glaucoma Incision. H. Herbert⁶ considers the section most suitable for the relief of glaucoma a limited sub-conjunctival incision in the transverse vertical plane, a millimeter behind the limbus, the conjunctiva at this point being only loosely attached. A sufficiently near approach to this section may be obtained by puncture and counter-puncture with a very narrow tapering knife. Though sufficiently peripheral superficially to facilitate diffusion of aqueous backward under the conjunctiva, it reaches the deep surface of the cornea well in front of the root of the iris. Although making only a limited opening into the anterior chamber, the incision is superficially long, so widening the area of diffusion. Thus the tendency to localized vesicular change from filtration through the conjunctiva is reduced to a minimum. It is this change which has been mainly responsible for the late infections reported after trephining. Permanent filtration through this incision is secured in chronic glaucoma if the wound is kept open twenty-four hours. One method of doing this is to fix a gilded metal rod by sutures so that it lies in the incision though on the conjunctiva, depressing the latter into the scleral groove. The method has the advantage of never emptying the anterior chamber, and during the operation there is only slight leakage. The operation, therefore, seems to be one of the safest imaginable. Apart from the danger of

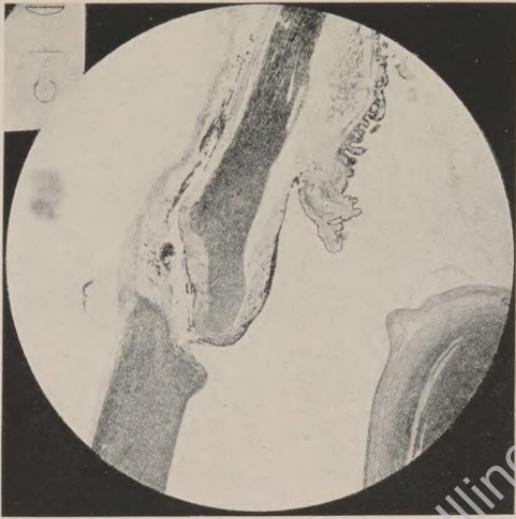
late infection being lessened, there is less risk of intra-ocular hemorrhage, and interference is reduced to the minimum. Ordinarily there is no need to interfere with the iris. The details still require to be fully worked out. It is desirable to avoid all unnecessary displacement of the conjunctiva, which tends to localize filtration, and in the second place it is necessary to provide sufficiently free leakage of aqueous in congestive and absolute glaucomas.

Holth's Punch Operation for Glaucoma. T. Harrison Butler⁷ says of this admirable operation that, among other advantages it has simplicity of technique to commend it. The operation is performed as follows:

If the eye be inflamed, the patient is anesthetized with gas and ether administered with Clover's inhaler. (Most of this interesting article is quoted verbatim.)

"I dislike," says the writer, "to give chloroform and never use it for my cases. Generally, however, I use a 4 per cent. solution of cocaine, instilled four times at intervals of five minutes. With the first instillation, I give a few drops of 1 per cent. solution of eserine sulphate. The lachrymal sac is previously syringed out, to exclude dacryocystitis, and if the conjunctiva be at all abnormal in appearance, cultures are made to determine the nature of the bacterial contents of the sac. The eye is douched with a solution of oxycyanide of mercury, 1 to 5000, and the lashes are cut short. The lids, and especially their edges, may be washed with ordinary soap and water, and then well-rubbed with a swab. I now simply paint the lids and lid margins with tincture of iodine which has been dipped into a solution of biniodide of mercury, 1 to 500, and squeezed till no more of the fluid can be expressed. The speculum is now inserted, and the usual Elliot flap cut and reflected down to the limbus with squint scissors. I then split the cornea with a small scalpel as far as was usual in the older Elliot operation. I split it far enough to bring my opening close to the cornea, but not necessarily into it. The flap is held down with fine forceps which have no teeth, and the point of the knife entered at a spot 1.5 mm. from the limbus. The flap is replaced over the knife by the assistant, and the instrument is pushed forward till its

PLATE VIII.



a. Holth's glaucoma operation. Case K. S. right eye. Sagittal section through the center of the scar (along the dotted line in the inset figure). This shows the condition found 4½ years after a meridional iridectomy with iridencleisis. The iris has prevented union between the sides of the wound and a typical fistula has formed between the anterior chamber and the subconjunctival tissue. Magnification 18/1.—Holth (see page 138).



b. Holth's glaucoma operation. Case M. G. This section shows the left nerve head. Before the operation the cup was 4 D. deep. Magnification 14/1.—Holth (see page 138).

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point is seen in the anterior chamber. The point of the keratome may catch in the iris and produce a slight iridodialysis. This is, I think, an advantage, because it helps to clear the iridic angle, which is desirable in glaucoma. The patient must then look down while the punch is inserted slowly and the scleral disc punched out. It must be noted that the cutting blade is underhung, so that the lower (female) blade must be passed in further than may appear to be necessary. A D-shaped orifice results, which should just include a portion of the cornea. If any iris prolapse, it should be seized and excised. Otherwise, if an iridectomy be desired the iris should be withdrawn with Liebreich's (Matthieu's) forceps. The flap is finally replaced and held in place with a suture. For some time I gave up the suture, but the bad results obtained have decided me to revert to its use. The eyes are covered with a double pad for forty-eight hours, and then inspected. If there be any undue injection, atropine is instilled. After forty-eight hours, I often leave both eyes open, using a large shade to exclude glare."

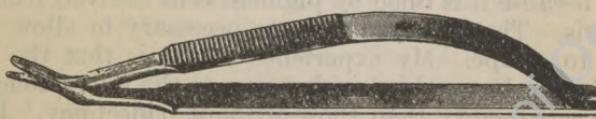


Fig. 30.—Holth's Broad Needle.

Butler has performed the operation twenty-nine times to date.

"In some of my operations I did not suture the flap. I found that a bare surface was left which took some

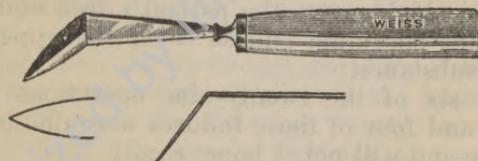


Fig. 31.—Holth's Glaucoma Punch.

time to cicatrize over. The resulting scar tissue can not favor free filtration. One of my recent cases, however, convinced me that the sutures were absolutely necessary. At the first dressing, forty-eight hours after the operation, I found that the flap had curled down over the cornea leaving the hole exposed. I gave an anesthetic, and sutured the flap in place. The patient was very alcoholic, but no infection took place and the result was good.

"I hold that iridectomy, basal or complete, is necessary for three reasons. If it be omitted, the iris may prolapse into the hole and block it. This actually happened to one of my patients, and it will be necessary to repeat the operation. Thomas Henderson has shown that the cut iris never heals and he believes that it acts as a sort of wick, allowing the aqueous to enter its lymph spaces and reach the channels of exit. For this reason, therefore, I prefer to add the known benefits of iridectomy to my filtering scar. Finally, Holth showed some specimens to the Heidelberg Congress of 1913, which demonstrated the fact that a fistula may be kept permanent because it is lined by pigment cells derived from the cut iris. The iridectomy seems necessary to allow these cells to escape. My experience so far is that the cases in which I have added iridectomy to the sclerectomy are more satisfactory than those without iridectomy. I now only use scissors to reflect the flap until I expose the limbus and see the glans-penis-like elevation described by Elliot. It is unnecessary to split the cornea with a knife.

"On one occasion I button-holed the flap just over the orifice, but I sutured it up and no trace of the rent can now be seen.

"The short keratome I use is unlikely to touch the lids, but to render such contact harmless, I tuck the edge of the gauze which covers the patient's face under the top limb of the speculum and so cover the upper lid with a sterile substance.

"Only six of the twenty-nine operations have been failures, and four of those failures were due to defective technique and will not, I hope, recur.

"Two were due to the fact that the piece removed was too small.

"One case failed to filter because the hole was eventually blocked with iris. It was satisfactory for about three weeks.

"In another case I entered the keratome too far back, and removed an unnecessarily long piece of sclera. Some vitreous prolapsed, and in consequence there was no filtration. This case had a tragic sequel. I repeated the operation, which appeared to be a perfect one, but the same night the patient became wildly maniacal and bit one of the nurses and the house-surgeon. The latter gave him half a grain of morphine by injection. This had no result, so in half an hour the injection was repeated. The patient died next day from exhaustion, perhaps helped by the depression caused by the morphine. The post-mortem examination showed that most of the cerebral arteries were in a state of advanced calcification and that the kidneys were highly cirrhotic.

"Another case showed free filtration, but the tension was not reduced.

"The last failure was, perhaps, a case of late infection. Considerable iritis followed the operation, which, however, was a complete success for six months. The eye which had been in a state of acute glaucoma became soft and good vision returned. The patient was a careless, alcoholic woman. Six months after the operation, her lid was stung by a wasp, but she did not appear for some weeks after this complication, when I found that all filtration had ceased, the scar was yellowish, and the iris inflamed. A chronic iridocyclitis continued for some weeks, and eventually all sight disappeared.

"Only three of my cases have shown slight iritis, but I now instill atropine solution once at the time of the first dressing."

T-Shaped Sclerotomy. Van Lint^s thus describes this operation which he prefers to the procedures of Elliot and Lagrange :

"Starting from the horizontal meridian of the cornea, I dissect the conjunctiva all around the upper half of the cornea. I make the dissection deeply, in order that the conjunctival flap may be as thick as possible, and that the sclerotic may be well exposed. The dissection

ought to be made broadly, and should reach fully a centimeter from the corneal limbus. I then insert two threads of silk of medium thickness, one on each side of the cornea. In placing the inferior extremity of the threads, I introduce the needle beneath the conjunctiva, in the horizontal meridian of the cornea, near the limbus, to penetrate the conjunctiva 2 mm. lower. I introduce the needle which carries the superior extremity of the thread beneath the detached conjunctival flap about 10 mm. from the place of introduction of the inferior extremity of the thread.

"I next introduce the blade into the sclerotic, absolutely in the same manner as in antiglaucomatous iridectomy, with this difference that I place the section at 2 mm. or 2.5 mm. from the limbus instead of making it at 1 mm. or 1.5 mm. In consequence of the posterior situation of this section, the point of the knife, instead of passing in front of the iris, generally transfixes it and produces an iridodialysis.

"Sometimes I am content with the iridodialysis, sometimes I make a partial peripheral iridectomy; sometimes complete iridectomy.

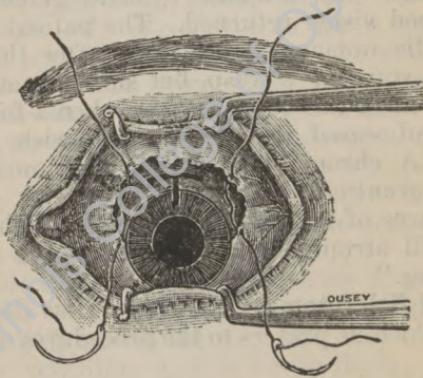


Fig. 32.—Van Lint's T-shaped Sclerotomy.

"I consider that in the acute or sub-acute forms of glaucoma one should make a complete iridectomy, and not be contented with peripheral iridectomy or iridodial-

ysis, as in the chonic forms. In a word, the interference with the iris ought to be the more considerable as the form of glaucoma is more acute. As the iris is often united to the cornea, and as the wound is more posterior than in the ordinary iridectomy, I often introduce the

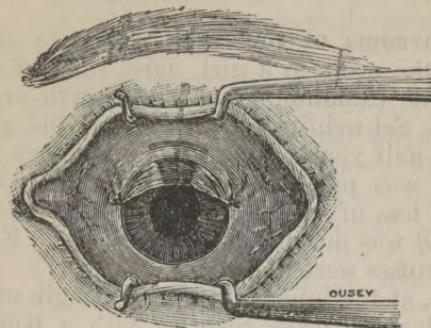


Fig. 33.—Van Lint's T-shaped Sclerotomy.

forceps behind the iris. Under these conditions, it is difficult to seize the iris with the forceps constructed with mouse teeth directed from the side of the convexity. It is then preferable to use a forceps of which the tooth between the arms of the forceps is directed toward the concavity.

"I now introduce one of the branches of a pair of straight, slender scissors, into the scleral wound at its middle, and push it sufficiently far toward the anterior chamber for the sclerocorneal section, made at one cut through the corneal tissue 1 mm. to 1.5 mm. from the limbus. The result is that the radiating section which starts from the middle of the scleral section concentric with the limbus, forms the vertical branch of T and measures from 3 to 4 mm.

"While an assistant with a forceps takes hold of the middle of the conjunctival flap and draws it over the sclerocorneal wound, which it ought to cover, I tie the threads inserted at the beginning of the operation and then cut them close to the knots. I keep a bandage over

the eye during several days and also instill pilocarpine three times a day for several weeks. I remove the threads on the fourth or fifth day. The conjunctival flap which covers the cornea, rises by degrees, and resumes its original situation at the end of a week."

THE ORBIT. THE EYEBALL.

Psammosarcoma of the Orbit. A case of psammosarcoma of the orbit in a girl, aged 13, and the results of microscopic examination of the growth are reported by G. E. de Schweinitz.⁹ Duration of the growth was two and one-half years. There was no history of trauma. The eyeball was pushed downward and outward, with no diplopia, loss of vision or fundus changes. Rotation of the eyeball was normal in all directions. Frontal and ethmoidal sinuses were not involved.

Operation, at the inner and upper margin of the orbit, revealed a large growth covered with a bony capsule. Removal of the bony covering was accompanied by escape of a small amount of clear fluid and the presence of a mass of tissue somewhat resembling brain tissue. Following the operation the eyeball returned to its normal position. There was diplopia at first, but it gradually subsided. Microscopic and chemical examination showed the presence of sarcoma cells and sand-bodies. There has been no recurrence of the growth.

Primary Epibulbar Leukosarcoma. A case of this rare neoplasm is described and depicted by R. H. Dickson.¹ I. L., a shoemaker, aged 77, in November, 1904, showed on the right eye, a large, purple-colored, fleshy, episcleral growth completely surrounding the upper half of the cornea, extending from the corneal margin back as far as could be seen.

The growth was firmly adherent to the underlying sclerotic, as well as to the conjunctiva covering it. The lens showed signs of incipient cataract, but the fundus could be seen fairly well, and appeared normal. V= 6/24. The patient stated that he had first noticed the growth five years before, as a small nodule on the outer

(9) Arch. Ophthal., p. 469, September, 1914.

(1) Ophthalmoscope, p. 146, March, 1914.

side of the cornea. It had gradually increased in size, and spread round the upper half of the cornea. There was no history of injury. At times he suffered from some pain in the growth, but, as a rule, there was little or no discomfort.

A piece of the tumor was excised, and forwarded to a pathologic institute for examination. It was reported to be simple granulation tissue. In the left eye was a mature cataract, which was successfully operated on, the eye being in other respects normal.

In May, 1905, the man again presented himself at the infirmary. The tumor on the right eye had considerably increased in size, and presented the appearance of a large, dark, purple-colored, fleshy, episcleral mass encircling the upper half of the cornea. It was thickest above, where it overlapped the corneal margin, and extended as far back as could be seen when the eye was rotated downward. It was of firm consistence, closely adherent to the sclera and to the conjunctiva covering it. The cornea was clear; the conjunctiva slightly hyperemic; the lens opaque. The lids could still be closed without difficulty. The vision was reduced to perception of light; the pupil acted normally to light and to accommodation; and the projection was good. The ocular movements were unrestricted except perhaps in the upward direction.

A further portion of the growth was excised, and sent for examination to Mr. W. H. McMullen, who reported that it was a small, round-celled sarcoma, and advised enucleation.

On June 1, 1905, the patient was admitted to hospital, and the following Sunday, June 4, the eye and the growth were excised *en masse*, and immediately put into a 10 per cent. solution of formaline. (See Plate IXa.)

The patient was seen on November 4, 1905. He looked in all respects the picture of health. There was no sign of any local recurrence of the growth, and careful examination showed lungs, liver, spleen, and kidneys to be in all respects normal. He died on November 24, 1910, from natural causes. There was no recurrence of the growth.

Spontaneous Rupture of the Eyeball. A decrepit girl, aged 9, affected with persistency of the foramen ovale, or some similar defect of the heart, complained of

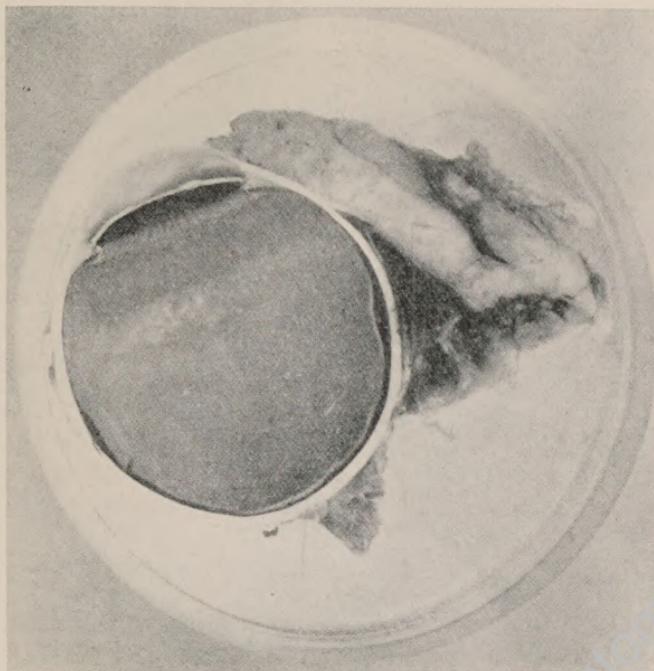
pain in the left eye. There was intense conjunctival and ciliary injection; the formerly blue iris was brown and showed numerous hemorrhages. The eye was very hard, blind, and the fundus could not be illuminated. The face, mucous membranes and the retina of the right eye were cyanotic. The intra-ocular hemorrhages became more frequent, filling the anterior chamber, the eyeball grew harder and more painful and, finally, a spontaneous rupture, 3 mm. long, of the sclera occurred at the upper part of the equator. The hemorrhages stopped at last, with subsequent shrinkage of the globe.

W. Goldzieher² explains the spontaneous rupture by assuming its origin at the exit of a vein. By the enormous congestion of the vein constant pressure was exerted, which led to a local stretching, thinning and rupture of the corresponding part of the scleral canal.

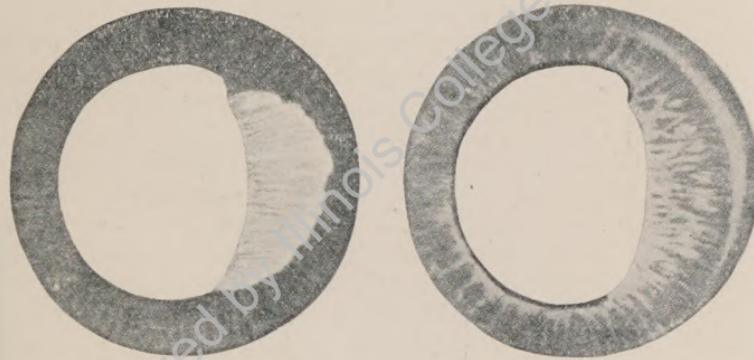
Traumatic Rupture of the Pigmented Epithelium of the Iris. Instances of this injury have been recorded by Gelpke (1887), Pohlenz (1891), and Boerma (1893). Coats³ had a case of this kind in a man, aged 61, whose right eye had been struck with a large piece of wood a month before he sought advice. Vision (corrected) = 6/12. A scar, about 3 mm. in length, was present in the center of the cornea. The pupil of the affected eye was slightly larger than that of the other eye, and was of oval shape, the major axis of the oval being directed obliquely downward and outward. On close examination, the stroma of the iris seemed to be looser on one side than the other. After the use of homatropine, the appearance of the parts, as shown by the figures, was very striking. The outer part of the iris remained flaccid, while the other parts retracted as usual. The pigmented rim was present except on the outer side. Light thrown into the eye from an ophthalmoscope gleamed through the interstices of the stroma in the affected part. See Plate IXb. With the transilluminator, the remarkable condition shown in the second figure was revealed. The outer segment of the iris opposed practically no barrier to the passage of the rays of light, so that the part in question was almost perfectly translucent.

(2) Centralbl. f. prkt. Augenheilk., p. 42, February, 1914.
(3) Trans. Oph. Soc. U. K., p. 184, Vol. 34, 1914.

PLATE IX.



a. Epibulbar sarcoma.—Dickson (see page 150).



b. Rupture of the iris pigment.—Coats (see page 152).

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The lesion is probably produced by driving back the iris, the rupture being the outcome either of excessive stretching or of nipping of the iris between cornea, on the one hand, and lens, on the other.

Finally, Coats points out that the clinical appearances in the foregoing case confirm the view of Langenhan and Fuchs, which is to the effect that the imperviousness of the iris to light depends chiefly on the pigmented epithelium. (Abstract in the *Ophthalmoscope*, December, 1914.)

Cases of Injuries From Foreign Bodies Examined by the Roentgen Rays. In the present communication W. M. Sweet⁴ reported 280 cases of ocular injury, in 185 of which the substance was found to be lodged in the eyeball or orbit. For the purpose of comparison 982 cases are embraced in the following statement:

Position of Body.	First Series.	Second Series.	Third Series.	Present Series.
In the eyelid	1	2	0	0
In the lens	3	14	16	7
In the iris or posterior chamber	1	4	4	2
In the ciliary region	24	27	12	19
Near the equator	21	69	52	51
Posterior part of eyeball	12	46	48	73
In the orbit	3	11	25	33
No body shown by x-rays	37	145	125	85
	102	318	282	280

In the above subdivision of the vitreous chamber the "ciliary region" includes all cases in which the body was situated in or close to the ciliary body; the equatorial region, all bodies situated at the equator or in an area 3 mm. in front or 3 mm. behind it; while the third division includes all cases in which the body was in the posterior part of the globe. Of the total 982 cases of injury, 812 were caused by particles of iron or steel, sixty by copper, brass, or other non-magnetic metal, seventy-three by shot, thirty-two by glass, and five by coal.

The right eye was injured in 452 cases and the left in 522 cases, and both eyes in eight cases.

The following figures give the ultimate result in the sixty-five cases in the first series, the 173 in the second

series, and the 157 in the third series in which a foreign body was located in the eyeball or surrounding tissues, with details of the 185 cases in the present group:

A summary of sixty-one cases, with the visual results secured, is given in the following statement:

Vision.	First Report.	Recent Examination.
6/6	5	4
6/9	3	4
6/12	3	1
6/15 to 6/30	5	3
6/60 or less	3	6
Fingers or hand movement	10	5
Good light perception	22	5
Imperfect light perception	5	12
No light perception, eye normal size	3	6
No light perception, eye shrunken	2	10
Enucleation	5

Of these sixty-one cases, the eyeball was subsequently lost in five—one five years after extraction for recurrent hemorrhages in the anterior chamber, one eight years and two two years from iridocyclitis, and one five years from iridocyclitis following a blow on the eye.

In six other cases in which extraction of the steel was unsuccessful the eyes have remained quiet. In one the eyeball is shrunken, but in the other five the globe is of normal size. In one opticociliary neurotomy was performed seven years ago, and the eyeball is of normal size and causes no trouble.

In the eighteen cases in which vision better than counting fingers was obtained, the wound of entrance of the foreign body was situated in the cornea in ten, at the limbus in five, and through the sclera in five. The position of the steel was shown by the Roentgen rays to be in the posterior part of the vitreous chamber in seven, near the equator in seven, and in the ciliary region in four.

Except in a few isolated instances in both the present and previous series of cases the steel was removed from the vitreous chamber through the original wound, if open, or if closed through an incision in the sclera close to the indicated situation of the body. It is believed that this method produces less traumatism to the structures of the

eyeball than extraction through the route of the anterior chamber. As has been emphasized in previous reports, it is difficult to make a satisfactory comparison of the value of operation by the two methods, since the ultimate result depends on a number of factors which are of as great if not greater importance than the method of extraction. Detachment of the retina occurs in a certain proportion of cases in which the steel has penetrated into the vitreous chamber and lodged in the retina or choroid, but this complication is largely influenced by the size and situation of the foreign body and the length of time it has remained in the eye. In instances in which the steel after entering the vitreous drops to the bottom of the chamber, retinal detachment is a rare complication of extraction. It is probable that a certain proportion of instances of retinal detachment are due to the inflammation and subsequent contraction of the new-formed tissue at the point in the retina where the parts have been injured by a fairly large-sized body, or where a smaller body has remained for some days or weeks and considerable traumatism has followed the drag of the magnet in disengaging the body from the exudate in which it is imbedded.

In the cases in which a clear media permits an examination of the retina at the site of the incision in the sclera made for the purpose of magnet extraction, detachment of the retina has not been found.

Blindness After Campaigning. W. H. H. Jessop⁵ is impressed by the extraordinary number of patients from the war front who are blind. In many instances nothing was observable by the ophthalmoscope, and without treatment other than rest, perfect sight had been regained. In two cases the blindness was accompanied by blepharospasm; these ended in recovery. All the patients had been exposed to shell fire and Jessop considered this a factor. He cites, also, a case of a man who had formerly suffered from miner's nystagmus; on enlisting this man was employed as a driver and his nystagmus returned.

Cases of Sympathetic Ophthalmia Without Characteristic Changes of the First Eye. Fuchs was the first who showed different lesions in sympathetic ophthalmia

of the exciting eye. These are mostly proliferations of the type of chronic granulation tumors, from other post-traumatic inflammations. From an examination of two cases, J. Moller⁶ concluded that all cases of sympathetic ophthalmia of the second eye do not exhibit such marked specific changes as are found in the first eye. He found this state of affairs in 4 per cent. of his material, confined to cases in which, as in the two reported, the affection of the second eye becomes manifest after enucleation of the first eye (12 and 27 days). This rarity of the histologic findings does not in the least change the fact that sympathetic ophthalmia of the first eye is a specific, morbid process similar to that by which the disease in the second eye is produced, and is essentially different from other post-traumatic inflammations, *e. g.*, septic endophthalmitis. If by enucleation the development of the specific morbid process is prematurely terminated, the histologic diagnosis may become difficult on account of the insufficient development of the process. If the second eye shows organic changes, the process in the first eye is so far-advanced that, histologically, it can be recognized as such. Nothing definite is known regarding how long it lasts, until the histologic changes have so far developed that they can be diagnosed as specific.

Sympathetic Ophthalmia After Enucleation. Fanny Jampolsky⁷ reports eight cases, which show that the results were better than usual since almost 60 per cent. healed with good vision. On the other hand, the course of the disease may lead to complete blindness. The gravity of the disease is independent of the time between the injury and the outbreak of sympathetic ophthalmia. In one severe case the interval was thirty days, in a light case there was an interval of thirty-one days. The period between injury and enucleation does not seem to influence the seriousness of the sympathetic ophthalmia, as shown in one severe case with enucleation after eighteen days, as well as in a mild case with enucleation after thirty-nine days. Finally, the period between enucleation and the beginning of sympathetic ophthalmia seems to be apart from the gravity of the disease.

(6) Arch. f. Ophthal., p. 282, Vol. 88.

(7) Zeitschr. f. Augenheilk., p. 233, October, 1914.

Enucleation With Transplantation of Fat into the Orbit. An important paper on this subject is contributed by Edward Stieren.⁸

The writer reminds us that it becomes our duty, when called on to remove an eye, to provide for a cosmetic after-result that will simulate, as nearly as possible, a normal appearance, and to strive not only for mobility of the artificial eye but to provide as well a sufficient cushion or stump for it to rest on and thus do away with the tell-tale depression of the upper lid, so conspicuous in simple enucleations.

For the past two years and a half Stieren has transplanted fat into the orbit in all of his cases of enucleation—sixty-six in all.

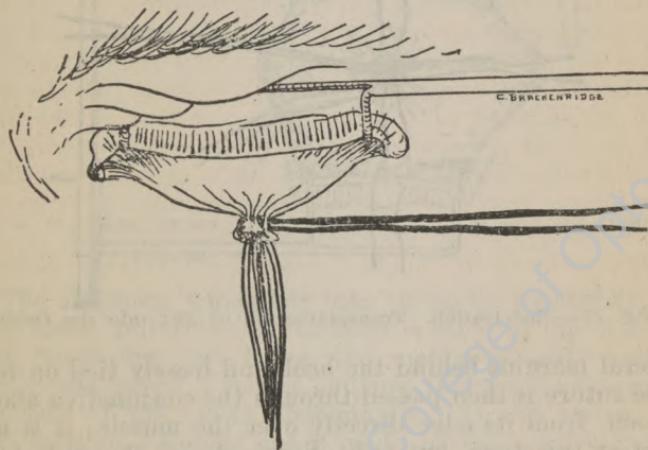


Fig. 34.—Enucleation Transplantation of Fat into the Orbit.

In the last twenty-six cases he has departed from the usual technique, as originally proposed by Barraquer, since with it he noticed too frequently a shrinkage of the cushion from absorption of the fat. He reasoned that the old technique provided for entirely too little fat, and also that the fat was not favorably placed to secure the best nourishment. The success with the improved technique, which calls for a much larger piece

(8) Jour. Amer. Med. Ass'n., Aug. 15, 1914.

of fat and direct union of the fat to the conjunctiva, has been most gratifying.

The writer describes his technique as follows: He divides the conjunctiva close to the limbus, dissecting it and Tenon's capsule back as far as possible. A strabismus hook is then introduced under the superior rectus, which is held by an assistant while a double-armed No. 00 twenty-day chromic catgut suture is passed through the muscle from below upward close to its

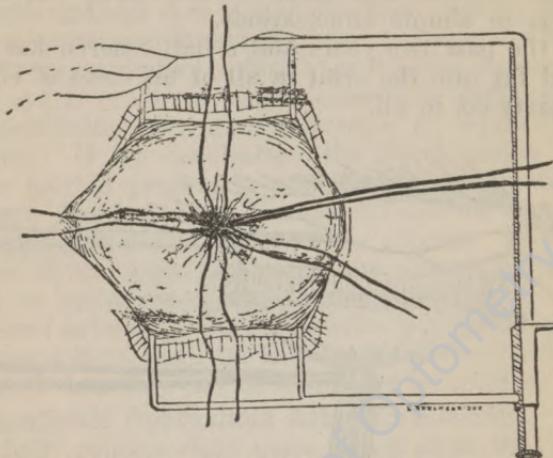


Fig. 35.—Enucleation. Transplantation of Fat into the Orbit.

lateral margins behind the hook and loosely tied on top. The suture is then passed through the conjunctiva about 2 mm. from its edge directly over the muscle; it is not tied at this time, but only disarmed and the ends held in a pair of hemostats. The internal, inferior and external recti muscles with their overlying conjunctiva are similarly treated (see illustrations). The eyeball is then forced out of the socket by pressing the speculum backward, drawn toward the nose, and the optic nerve severed. The oblique muscles and any adherent tissues are severed and the socket turned over to an assistant, who, making gentle traction on the four catgut sutures and retracting the conjunctiva and muscles, checks the hemorrhage by packing the cavity with hot moist boric-acid cotton compresses.

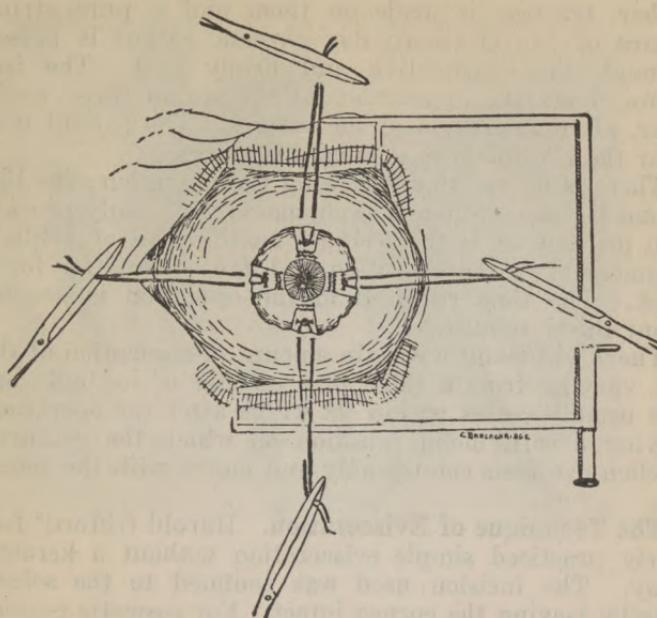


Fig. 36.—Enucleation. Transplantation of Fat into the Orbit.

The abdomen, which has been prepared previously, is now bared and a vertical incision is made in the median line beginning just below the umbilicus and carried downward about 2 inches, cutting through to the aponeurosis of the rectus abdominalis. At the bottom of this incision a similar one is made at right angles and a flap dissected which contains the full thickness of the abdominal fat. A piece of fat which should include the subcutaneous tissue and which should be *about the size of the enucleated eye* is then excised. The abdominal wound is turned over to a second assistant who checks hemorrhage and sutures the integument. The excised mass of fat is then introduced into the orbit (hemorrhage from which is usually checked by this time) *with the subcutaneous tissue upward*, so as to provide for union between it and the edges of the severed ocular muscles and conjunctiva. The catgut sutures are then tied to-

gether, traction is made on them and a purse-string suture of No. 0 twenty-day chromic catgut is passed through the conjunctiva and firmly tied. The last figure shows the appearance of the stump three weeks later, after absorption of the sutures. The patient may wear the prosthesis as soon as this occurs.

There is no reaction following the operation; the lids do not become swollen or ecchymosed. The only precaution insisted on is the writer's modification of White's ointment after the operation and daily thereafter for a week. The time required in the operation is usually about thirty minutes.

There will result a certain amount of absorption of the fat, varying from a third to a quarter of its bulk, but this usually ceases within six weeks after the operation, leaving a soft, mobile cushion on which the ordinary Snellen eye rests comfortably and moves with the sound eye.

The Technique of Evisceration. Harold Gifford⁹ formerly practiced simple evisceration without a keratectomy. The incision used was confined to the sclera, thereby leaving the cornea intact. For cosmetic reasons this was abandoned for Mules' operation, without excision of the cornea, with much satisfaction to the operator, until he had a case in which the operation was followed by sympathetic ophthalmia, eventuating in total blindness. This unfortunate experience has compelled him to renounce all modifications of Mules' operation, except when the patient specifically accepts a slightly increased risk for a slight cosmetic advantage. He does not hesitate, however, to recommend his modification without keratectomy (which is described in detail) to any who prefer some variety of Mules' operation.

Simple evisceration, without keratectomy, which Gifford now employs as a prophylactic against sympathetic ophthalmia is given briefly as follows: First, a transverse incision of the cornea, extending one-quarter inch into scleral tissue on either side; second, the contents of the globe are scraped out with great care, especially at the entrance of the optic nerve and in the region of the ciliary body; third, the cavity is vigorously rubbed

PLATE X.



a. Tumor of the lachrymal gland. The tumor as seen from in front.—Elliot and Ingram (see page 162).



b. Tumor of the lachrymal gland. Showing the mass evidently representing the accessory portion of the gland.—Elliot and Ingram (see page 162).

Digitized by Illinois College of Optometry

out with globular gauze swabs; fourth, irrigation with sterile boric solution; fifth, the anterior half of the sclerocorneal wall is pushed against the posterior half, and retained by a good-sized globular sponge under a compression bandage. The gauze sponge, which was previously dipped in sterile zinc oxide ointment, is removed after forty-eight hours.

Local Anesthesia in Extirpations of the Lachrymal Sac. A new method of local anesthesia, tested on over 100 extirpations of the tear sac within the last three years, is described by E. Seidel.¹ It insures complete anesthesia and anemia without edema of the operating field. The principal difference between this method and infiltration anesthesia lies in the fact that the field of operation is not anesthetized but the conduction is interrupted of the sensitive nerves of the tear sac, *viz.*, the nasociliary nerve, the ethmoidal and the infra-trochlear nerves. The contents of the lachrymal sac are pressed out, and a 2 per cent. solution of novocain, with five drops of adrenaline to 10 c.cm., is injected into the sac. After disinfection of the skin and application of iodine an injection is made with a needle, 2.5 cm. long, at the anterior ethmoidal foramen, in the following manner: 0.75 cm. laterally from the intersection of the orbito-palpebral sulcus and a vertical line through the medial commissure, the palpebral fissure being half open, the needle is introduced horizontally through the upper lid 2.5 cm. backward and to the medial side. The lower point of injection lies close above the infra-orbital margin, a little to the inner aspect of the infra-orbital foramen. The needle is directed upward and inward through the lower lid to the medial orbital wall. In all 2 c.c. of the solution are injected. Sometimes slight exophthalmus occurs, which disappears at the first dressing.

[There must be an important difference between the sensory nerves of Americans and some foreigners. The Editor believes that all the usual forms of removal of the lachrymal sac require general anesthesia, as a rule, in this country.—ED.]

(1) Arch. f. Ophthal., Vol. 87, p. 184.

Tumor of the Lachrymal Gland. R. H. Elliot and A. C. Ingram² give a most interesting account of several of these rare new growths. One patient, aged 18, Hindu female, furnished the following history. She noticed a small swelling, about the size of a pea, on the left upper lid over a year before seeking medical advice. It commenced close to the seat of the lachrymal gland, and has been growing steadily. For a month there had been constant, dull aching in and around the swelling. There was also increased lachrymation and some discharge from the eye. No headache.

The first photograph (Plate Xa) shows the appearance of the tumor as seen from in front, while the second (Plate Xb) shows the mass evidently representing the accessory portion of the gland. The latter has obliterated the conjunctival cul-de-sac, and is firmly adherent to the conjunctiva in this region.

Condition on entrance to hospital: The edge of the upper lid was thickened, and the conjunctiva inflamed. The conjunctival surface of the tumor was reddened, irregular, and granular in appearance. The skin showed a number of large veins. It was not adherent to the tumor at any part; but was slightly congested. The tumor was rather firmly fixed, but admitted a certain amount of movement over the bone beneath it. The skin surface of the growth felt very hard, was knobby and irregular, and gave the impression of a cartilaginous tumor. On pressing firmly downward, the tumor could be distinctly separated from the orbital margin, a groove being felt between them. The movements of the eyeball inward and downward were free, outward very limited, and upward limited to the horizontal plane. The eyeball was somewhat rotated downward, and appeared to be indented by the pressure of the growth which had pushed the conjunctiva in front of it nearly up to the margin of the cornea. Its firmest point of attachment seemed to be at the usual seat of the lachrymal gland. It measured 43 mm. in length, 35 mm. in breadth, and 23 mm. in thickness. The conjunctival cul-de-sac was of normal depth on the inner side, but toward the outer side it became shallower to eventual obliteration.

(2) Ophthalmoscope, p. 66, February, 1914.

Operation: An incision was made below the eyebrow and the tumor was shelled out entire. Its firmest attachment was in the fossa of the lachrymal gland, but there was no bony attachment, simply that by fibrous tissue. No trace of the lachrymal gland as an independent structure could be found; that portion of the conjunctiva which was adherent to the accessory portion of the tumor was necessarily sacrificed. The conjunctiva was sutured up, a fair covering being obtained. The eyeball was not at all interfered with. The skin wound was closed by three sutures.

The woman did well, although the scar was somewhat adherent to the bone of the superciliary ridge, and there was some drooping of the lid. On discharge, massage was advised for this.

The patient returned two years later with a huge inoperable recurrence.

OCULAR THERAPEUTICS.

The Effect of Quinine Alkaloids on Infection of the Cornea of Rabbits by Pneumococci. Morgenroth and Levy showed that certain quinine alkaloids, especially hydrochloride of ethylhydrocupreine kill pneumococci in the test tube and in the living mouse in doses which may be applied without damage to the organism. Thus for the first time the possibility of curing a bacterial infection (not caused by spirochetes or protozoa) was proved.

S. Ginsburg and M. Kaufmann³ have experimented on the eyes of rabbits to decide whether infection of the cornea by pneumococci can be therapeutically influenced by the quinine derivatives and in what time the cocci are killed by treatment. The rabbits were infected with pneumococcus blood in the following manner: The blood of mice or rabbits that had succumbed to pneumococcus sepsis, was diluted with bouillon. With a Pravaz's syringe a small quantity was injected into one cornea, the other being left intact for control. An opaque halo of from 3 to 4 mm. developed around the inoculation area, which disappeared after half an hour. This infiltration became after 24 hours a purulent focus with thick

(3) Klin. Monats. f. Augenheilk., p. 804, Vol. 51.

radiating processes in the form of a star. The treatment consisted in instilling a 2 per cent. solution of ethylhydrocupreine with subconjunctival injections, which were not irritating. The instillations did not suffice to kill the pneumococci within an hour. The injections showed the important fact that their effect depends not only on the concentration but especially on the time of action. After twenty-four hours one-half of the corneae treated were sterile, and the results were even better if the injection was repeated after twenty-four hours. The virulence was tested by inoculations of the powdered cornea upon mice. A two per cent. solution of quinine had the same effect.

M. Goldschmidt⁴ has also written and experimented on the same subject. He reports on thirty cases of pneumococcus infection of the eye—in *serpent ulcer*, *diseases of the lachrymal sac*, and *conjunctivitis*—treated with *instillations of hydrochloride of ethylhydrocupreine* in 1 per cent. aqueous solutions, which remained for about half a minute in the conjunctival sac. In the treatment of the ulcers atropine was also used, but no warm applications.

Stronger watery solutions than 1 per cent. of ethylhydrocupreine caused superficial necrosis of the conjunctiva, while 2 per cent. solutions in oil were insufficient. Subconjunctival injections of 1 per cent. solutions caused intense chemosis, and 2 per cent. solutions necrosis. One or 2 per cent. salve, applied five or six times, had the same effect as the solution. The reports show that ethylhydrocupreine rapidly and invariably sterilizes the conjunctival sac, flattens and removes the progressive wall of serpent ulcers, and causes a subsidence of hypopyon. The writer's experience is in accord with the experimental results of Morgenroth, that this rapid and complete sterilization is due to disinfection, not immunization. That the cure is a specific one is shown by the fact that under the influence of ethylhydrocupreine the pneumococci disappear from the conjunctival sac, while it has no influence on staphylococci, diplobacilli or actinomycosis. It is also a prophylactic, as may be inferred from the rapid disinfection of the con-

(4) Klin. Monats. f. Augenheilk., p. 449, Vol. 51.

junctival sac and the prevention of infection post-traumatic erosions of the cornea.

The foregoing claims have been corroborated by Alfred Wiener,⁵ who was led to resort to the use of ethylhydrocupreine in a severe example of pneumococcus corneal ulcer (the individual having dacryocystitis) by the favorable reports of Morgenroth and Goldschmidt. The ulcer was bathed with a few drops of a 1 per cent. solution of the remedy every hour, six hours on the first day and twelve hours on the second. There was an astonishing response to treatment after eighteen hours and on the third day, with the exception of a slight depression and faint macula in the region of the ulcer, the cornea was practically normal in appearance.

The Basis for Light Treatment in Diseases of the Eye. As is well known, the rays emitted by intense sources of light are only in part visible. A very great proportion does not reach the parts of the eye which are sensitive to light, others are unable to excite them. These invisible rays have a specific chemical effect and exert a particular effect on the living cells so far as they are absorbed or changed by them. May we not also produce therapeutic effects on the eye by means of such rays?

We have also dark-blue light filters which weaken very much the rays which affect the retina and yet permit those to pass which are absorbed by the exterior eye in considerable quantities. The most suitable is, according to F. Schanz,⁶ uviol glass. Injuries to the lens, if this glass be used, are also not probable. It has been ascertained experimentally that the epithelium of the lens suffers from exposure to intensive light. These injuries must be very quickly made good, for after very strong dazzling there are no visible changes in the lens. The writer reported the case of a patient who contracted cataract prematurely in an eye which had also suffered from serious electrical ophthalmia. Such exposures to intense light do not come into question in light therapy. We have, however, a means of withdrawing from the light a considerable proportion of the rays which affect the lens without, at the same time, weakening the shorter

(5) Medical Record, Jan. 17, 1914.

(6) Ophthalmology, April, 1914.

rays too much. That is the so-called Wood filter, which absorbs, in a thickness of 1 cm. at a concentration of 1:20,000, all the blue and violet and some of the ultra-violet rays and permits the passage of the other ultra-violet rays, particularly those having a wave-length of $250 \mu\mu$. If the Wood filter is introduced between the light source and the eye, then the color of the flourescing lens changes. This is due to the fact that a considerable part of the rays, which affect the lens, is absorbed by the filter. If we take the precaution of introducing a Wood filter as well as the uviol glass between the source of light and the eye, then, according to the opinion of the writer, all danger of injury to the lens is excluded. We have a dark light, with which we can bring about an intense stimulation of the cornea and conjunctiva without danger of injuring the interior of the eye.

Schanz further says: "For therapeutic experiments I have placed a trough of blue uviol glass filled with Wood filter-solution before a quartz lamp and have concentrated the light which has passed through this filter on diseased eyes by means of a quartz-lens. I have seen from this procedure surprisingly quick healing of ulcerations, pannus and infiltrations of the cornea. I have made use of this same treatment with parenchymatous inflammations of the cornea and eczema of the lids and consider my treatment to have been very successful. We can increase the effect of light on the cornea still more. We can very often increase the sensitiveness for light, if we drop fluorescin on to the conjunctiva. The inflamed spot takes on a green color and fluoresces wonderfully in this dark light.

"We know that it is comparatively easy to kill off bacteria by means of short rays, and it is not improbable that many of them fall victims to the light easier than the tissue which harbors them. We have the *uleus serpens* on the cornea. This is a superficial pneumococcus infection. The pneumococcus is a microorganism which is easily affected by external influences. Should it not be possible to injure these by means of light, before the tissue itself is injuriously affected? Hertel and others have already made experiments in this direction. I have also made them. I have only selected eyes which were

blind or in which there was no hope of restoring the vision. The results appeared to be favorable, but the number of the experiments is too small to permit of a definite opinion. I do not consider it impossible that we, in this way, will be able to attain success with this affection, where we today are often helpless.

"As in the case of patients who have been operated on, it is advisable to choose as light, sunny sickrooms as possible and to protect the eyes by dark-blue glasses; or to allow the light from sources of intensive artificial light to fall on the eye through such glasses or the above-mentioned filter. I use for the protective blue glasses the brenphos-glass of the *Deutsche Spiegelglas-Actiengesellschaft in Freden*. The factory also produces the Euphos glass. There are Euphos light glasses, of which there are three grades. They absorb, in thickness of 4.5, 3 and 1.5 mm. all the invisible rays of an arc lamp completely. The Euphos gray glasses are so adjusted that they absorb the invisible rays completely and weaken the visible ones uniformly, as in the case of smoked glasses. These are also to be had in three grades. The glasses for artificial sources of light are produced by Gebrüder Putzler, *Glashüttenwerke in Penzig (Schlesien)*. Lamp chimneys, globes for arc-lamps and bulbs for glow-lamps may be had in great selection."

[The use of esculin glasses, the *verres à l'esculine* of French ophthalmologists, should not be forgotten in this connection. These protectives, which have been recommended by Landolt and others, are made by arranging a layer of this substance (the fluorescent, active principle of the horse-chestnut) between two layers of ordinary glass, cemented at their edges. It is claimed that the film of esculin admits more of the red, visual rays and fewer of the ultra-violet rays than any other form of tinted lenses, including euphos, uviol and similar glass. These protectives were presented and described at a meeting of the *Société Française d'Ophthalmologie* in 1906.—ED.]

Subconjunctival Injections. H. W. Woodruff⁷ discusses the use of various drugs and the strengths used in subconjunctival injections. He reports five cases treated

by this means and concludes as follows: (1) Subconjunctival injections have a limited sphere of usefulness. In all chronic conditions, such as optic nerve atrophy, leucoma of the cornea and detached retina, they have not been proven of any value. (2) A subconjunctival injection of any soluble substance, except adrenaline, eserine and pilocarpine, will cause a temporary rise in tension and therefore should not be used in glaucoma. (3) In acute purulent processes of the anterior segment of the globe, subconjunctival injections of cyanide of mercury are effective if used early. At the present time no other known treatment will so rapidly bring about resolution.

Subconjunctival Injections of Cyanide of Mercury in Ophthalmology. C. B. Meding⁸ reports the results of subconjunctival injection of *mercuric cyanide* in patients who came under his observation at the Amritsar Hospital, India. The results coincide with the conclusions of H. W. Woodruff, just given. The condensed report follows:

Condition.	Number Injected.	Good Results.	No Results.
Opacities of vitreous	1	1	..
Trachomatous keratitis (pannus)....	100	75	3
Ulcers, acute-indolent	40	25	5
Ulcer, hypopyon	3	2	..
Keratitis ulcerus suppurativa.....	2	1	..
Corneal opacities (recent?).....	28	10	..
Keratitis parenchymatous	3	1	..
Sympathetic ophthalmia	1	1	..
Episcleritis and scleritis.....	4	2	1
	<hr/> 182	<hr/> 118	<hr/> 9

In all these cases the treatment consisted of subconjunctival injections of from 10 to 20 minims of a 1 to 4000 solution of the cyanide of mercury in sterile water. Blepharospasm and lachrymation were promptly relieved; pain in scleritis and ulcers ceased; and recent corneal opacities were improved. Untoward accidents, such as necrosis, ecchymosis and injury of sclera were never observed. The author cautions against allowing the needle to engage in Tenon's capsule or injecting too

near the limbus. Children seem to stand stronger solutions than the aged, and a warmed solution seems less painful. The cyanide of mercury does not affect instruments. It is as potent as bichloride, yet less irritating and causes less adhesion. Whatever may be the value of salt solution in choroidal, retinal and neural affections it is not to be compared with the cyanide in the above group.

The Diagnostic and Therapeutic Uses of Tuberculin in Eye Diseases. A. E. Davis⁹ presents a full and interesting review of this subject. His conclusions are:

1. We may safely state that the tuberculin reaction tests play a part as important in arriving at a correct diagnosis in tuberculous diseases as does the Wassermann reaction in syphilitic diseases. Both are of the utmost value often in making a differential diagnosis.

2. As a therapeutic agent, tuberculin, used in the right way, is the most valuable remedy we possess in the treatment of ocular tuberculosis. Used consistently, and persistently over a long course of time, the results accomplished at times are little short of wonderful. But it should be ever kept in mind that we are dealing with a powerful toxin, and with one that is capable of doing much harm if not properly given, and in the right dose. Each patient must, therefore, be individualized and treated according to his or her reaction to the remedy, for we are dealing with a remedy that is not a cure in itself, but acts by stimulating the body cells to manufacture the "antibodies" or protective materials for its own defense agent, the tubercle bacillus.

The Oculocardiac Reflex: Ocular Compression in Diagnosis and Therapeutics. Although compression of the eyeballs has been, of late, the subject of numerous articles, all have referred to the phenomenon as one of mainly physiologic interest. More recently, says an editorial in the *New York Medical Journal*,¹ the slowing of the pulse and diminution of the intensity of the heart beats, which in some instances reached complete arrest and general collapse, the production of respiratory dis-

(9) *Am. Ophthal.*, January, 1914.
(1) May 16, 1914.

orders, such as cessation of the thoracic excursions and inspiration or spasmodic expiration, suppression of reflexes, and also polyuria, nausea, a tendency to fall forward, failure of the knees, and fainting, have claimed the attention of clinicians. In the light of present knowledge, several bulbar centers must be implicated in the process, the peripheral excitation being received, doubtless, through the sensory terminals of the fifth pair. It has been hoped, therefore, that compression of the eyeballs might prove of diagnostic and therapeutic value.

As to diagnosis, tentative tests have shown that in exophthalmic goiter, the *oculocardiac reflex*, as the phenomenon has been rather prematurely termed, was markedly exaggerated in most cases, since marked slowing of the heart beat could be obtained, as noted by Sainton and also by Lesieur, Vernet, and Petzetakis (*Lyon médicale*, April 5, 1914). In senile and alcoholic tremors practically no reaction was obtained; the reflex was also abolished in fourteen cases of Parkinson's disease. In general paralysis the results varied with the stage reached, very marked response having occurred in four out of six cases examined. This also proved true in multiple sclerosis.

As to therapeutics, the readiness with which morbid phenomena could be awakened by compression of the eyeballs led Loeper and Weill² to ascertain recently whether the procedure could not be resorted to as a remedial measure. The results obtained were such as to afford encouragement. In subjects who suffered from vertigo, tinnitus, pharyngeal and pharyngolaryngeal spasm, these morbid phenomena could be arrested for a time. Respiratory neuroses of an asthmatic type could sometimes be made to cease for a prolonged period. The most striking results, however, were obtained in a condition which occasionally causes considerable anxiety—more or less incoercible hiccup. In this condition bilateral compression of the eyeballs brings about instantaneous arrest of the symptom. Persistent yawning, as humiliating at times as it is uncontrollable, may also be mastered by the simple measure of compressing one's

(2) *Bull. et mém. de la soc. méd. des hôp.*, April 9, 1914.

eyeballs. This applies also to spasmodic sneezing, an expression of central hyperesthesia doubtless, since, as in a case witnessed by the writer, it may be brought on by trifling emotion, excitement, etc., irrespective of any physical irritation of the nasal mucosa. Though tried only in comparatively benign disorders, compression might ultimately be found useful for the control of some of the more severe forms of spasm, those of tetany, tetanus, puerperal eclampsia, etc., which so often thwart all remedial efforts. The so-called oculocardiac reflex is at least worthy of additional investigation.

Immuno-Therapy in Acute Blennorrheas. Fifteen cases of gono-blennorrhea, treated only by active immunization, are considered in a report by P. von Szily.³ As soon as the patient is seen, a culture is made on human serum agar, and from this, a vaccine is made twenty hours later. A heat of 60 C. is used for killing the organisms. The first injection is of 300 million and is followed on the next day by double the dose. Daily injections are made, increasing the dosage 100 million each time, for five or six days. The maximum dose contains 800 million killed organisms. In the cases reported, the secretion and the bacteria disappeared within three days, followed by a typical (Arlt) chronic, gonorrheal conjunctivitis, which lasted about one week.

Jequirity in Ophthalmic Practice. C. J. Lukens⁴ has used this well-known remedy with excellent results, and prefers it in powdered form. He has found it very useful in cases of trachoma not only where well-defined pannus existed, but also in cases with but little pannus. He says that after its use a mild boracic wash is all that is necessary and that the eyes do not become "strong" for at least three months. The formation of a false membrane is desired. He gets better results, the more the swelling and edema, especially if these are followed for some time by a profuse discharge. He uses jequirity in old, indolent ulcers and phlyctenulae, but does not attempt to employ it in acute, inflammatory ulcer.

(3) Berlin. klin. Wochenschr., June 15, 1914.

(4) Jour. Oklahoma State Med. Ass'n, January, 1914.

GENERAL DISEASES AND OCULAR SYMPTOMS.

Relation of General Arteriosclerosis to Certain Ocular Conditions. Elsworth Smith⁵ calls attention to the fact that vascular disease, either primary or secondary, is responsible for the majority of deaths. Osler defined arteriosclerosis as "a condition of thickening, diffuse or circumscribed, beginning in the intima, consequent on primary changes in the media and adventitia, but later involving the latter two coats. The process leads in the larger arteries to what is known as atheroma and endarteritis obliterans, and seriously interferes with the normal functions of the several organs."

The author divides the etiologic factors in the disease into four great classes, namely, (1) the wear and tear of life, under which head is included heredity; (2) acute infections; (3) intoxications exogenous and endogenous; (4) conditions which keep up high tension, chief among which is overeating, especially excessive eating of meat.

Pathologically, the disease is primarily a degeneration and weakening of the media, with a secondary proliferation of the intima. Calcareous deposits may result in pipe-stem arteries, or the proliferating process in the intima may cause endarteritis obliterans, with the consequent disturbances of nutrition in the area supplied by the vessels.

While organic changes in the vessel walls can not be undone, much can be done toward arresting and limiting the process by removing causative factors. It is important that the condition be recognized early.

The eye is the organ in which arteriosclerosis is often earliest manifested and where it can be more accurately appreciated through study of its background. In albuminuric retinitis of a degenerative form, arteriosclerosis is most typically manifested, presenting an ophthalmic picture of thickened tortuous arteries, strapping of the veins, hemorrhages, exudations, degenerations, etc., all of which point to a degeneration of the retinal vessels.

Cushing has made a claim that choked disc and albuminuric retinitis are practically the same pathologic process, and are both produced through increased intra-

cranial pressure, but the author does not believe that we should go beyond the diseased condition of the retinal arteries for an explanation of the retinal lesion. The writer thinks that if general vascular sclerosis can be responsible for retinitis, that it might also be responsible for an inflammatory process in the choroid, the vascular coat of the eye. In subjects of general arteriosclerosis, hemorrhages into the vitreous may follow rupture of the vessels of the retina and choroid. As a rule, they are not entirely absorbed, but leave fixed or floating opacities. The writer suggests the probability of a relation between arteriosclerosis and glaucoma.

Aside from operative measures, bichloride of mercury and iodide of potassium are valuable in both luetic and non-luetic cases. If the condition of the eye is grave enough to threaten the integrity of the organ, the patient should have complete rest in bed. In less urgent cases, the patient should be advised to keep as free as possible from all sources of worry and strain, a strenuous life must be dropped, moderate exercise and careful diet are advised. Alcohol and nicotine and meat should be limited in amount, milk and buttermilk be taken freely and iodide of potassium is of value. Vasodilators such as nitroglycerine and sodium nitrate are given to meet emergencies in such cases as are threatened with excessive hypertension.

The Clinical Pathology of Syphilis of the Eye. The latest histo-pathologic facts concerning syphilis of the eye are given by Sydney Stephenson.⁶ He considers the four following recent advances regarding syphilis, as it concerns ophthalmology no less than other branches of medicine:

1. The discovery, by Metchnikoff and Roux, in 1903, that syphilis can be inoculated into the preputial fold of the clitoris or the eyebrow of the chimpanzee (*Troglodytes niger* and *clavus*), with the production of a chancre and of secondary symptoms, and can be transmitted from one chimpanzee to another.

2. The recognition of Schaudinn and Hoffman, in 1905, of the protozoön or bacterium known as the

Spirochaeta or *Treponema pallidum* as the cause of the disease.

3. The serodiagnosis of syphilis, introduced by August von Wassermann in 1906, which allows us to recognize the existence of the disease in a patient's system and to "check up" the results of treatment, altogether apart from clinical manifestations.

4. The discovery, by Ehrlich and Hata, in 1909, of an arsenical compound, salvarsan, which, when injected into the veins, usually has a striking and rapid effect on the clinical manifestations of syphilis. In this connection the still more recent discovery of Ehrlich of neosalvarsan must also be mentioned.

Four axioms concerning the Wassermann reaction generally conceded are given as:

1. The reaction, when obtained, is proof positive of a syphilitic infection.

2. A negative Wassermann reaction does not, and never can, enable us to aver that syphilis is absent.

3. A positive reaction, even in the absence of clinical symptoms, is enough of itself to justify the employment of antiluetic remedies, as salvarsan or mercury.

4. The technique originally employed by Wassermann is more trustworthy than any of its subsequent modifications.

Comparing the luetin and palladin tests with the Wassermann reaction, they seem to be useful complements to the serum reaction.

Acute Disseminated Myelitis With Retrobulbar Inflammation of the Optic Nerves. Ward A. Holden⁷ reports a case (the fifth of a series) that caused complete blindness of one eye and almost complete blindness of the other, with subsequent restoration of useful vision in each. There was a lateral hemianopia in the field of one eye only. This same defect in the visual field was present in two of the three earlier cases in which the field of vision could be taken, and the writer regards the symptom as important in the diagnosis. This case, with the four other cases, completes the varieties of visual complications of disseminated spinal myelitis and shows that in over half of the cases there is lateral hemianopia for

one eye alone—a symptom which will be of considerable diagnostic value in the cases in which visual disturbances precede the spinal symptoms.

Permanent Impairment of Vision Following Gastro-Intestinal Hemorrhage. G. H. Grant⁸ refers to the cases reported in literature of impaired vision following hemorrhage. He finds that in 70 per cent. of them the hemorrhage was from the uterus or gastro-intestinal tract, and believes that there must be some underlying factor in addition to the loss of blood to produce amaurosis. In cases in which the visual field was taken, there was a concentric contraction in 20 per cent., and in 10 per cent. a homonymous hemianopsia was present. The lower half of the field was lost in 23 per cent and a central scotoma was present in 13 per cent. He refers to Holden's theory, to explain the pathologic changes, that the retinal ischemia produces a degeneration of the ganglion cells. The writer reports a case of amaurosis, in a man aged 66, following a severe gastro-intestinal hemorrhage. Ophthalmoscopic examination showed a diffuse pallor of the discs and blocking of several small retinal arteries.

The Eye Grounds in Psychoses. An examination of the ocular condition of psychopathic individuals reveals a relationship between the psychosis and certain changes in the eye. A knowledge of such relationship serves as a valuable aid to both psychiatrist and the ophthalmologist in the diagnosis and prognosis of many brain lesions. Owing to the close relation of the eyes to the brain extensive pathologic changes in the brain are attended with changes in the optic nerve, retina and the visible circulation of the retina and nerve.

W. L. Benedict,⁹ after a study of the subject, concludes that:

1. Well-defined disorders from extensive morbid conditions may exist for some time without change in the ophthalmoscopic appearance of the eye grounds.
2. Cases of dementia precox, either slowly developing or rapidly deteriorating, show no associated disc changes peculiar to this condition, but, on the other

(8) Arch. Ophthal., p. 234, May, 1914.

(9) Ann. Ophthal., April, 1914.

hand, present a higher percentage of normal fundi than either the organic or functional groups of psychoses.

3. In functional psychoses there is no definite association between the mental disorder and the ophthalmoscopic appearance of the eye ground.

Ocular Disturbances in Myxedema. In myxedema the following ocular affections have been occasionally observed: parenchymatous keratitis, cataract, retinal hemorrhages, chorioiditis, neuroretinitis, unilateral or bilateral atrophy of the optic nerve, hemianopsia and nyctalopia. A. Dutoit¹ reports the following case: A man, aged 25, of healthy parents, showed in his youth no symptoms of myxedema. His eyes were always weak from early childhood. From the twelfth year his vision grew worse, and when examined for military service he was practically blind. He presented the characteristic aspect of myxedema. The thyroidal region showed nothing abnormal, but the genital organs were infantile, the scrotum contained only one hard nodule of the size of a cherry stone.

The lids showed a constant tremor, were tightly closed, tense and hard. When they were forcibly opened, the cornea could be seen to move; the conjunctiva was thickened and edematous. Ocular movements were slow and hesitating and there was convergent strabismus of right eye. Pupils were enlarged and scarcely responded to light. Both eyes showed posterior cortical cataract, chorioiditis, large and small black pigment spots all over the retina, optic disc sharply defined and white, retinal vessels very narrow. Wassermann reaction was negative. The urine contained traces of albumin and sugar. Hearing was diminished.

Dutoit assumed a polyglandular disturbance in the sense of Brissaud, and attributes the ocular changes to lack of activity of the thyroid gland. While in certain cases of myxedema and after thyroideectomy a hypertrophy of the hypophysis was observed (so that the optic atrophy could be ascribed to pressure) the Roentgen rays showed in this case no changes of the sella turcica or hypophysis. Hence the writer considered the atrophy of the optic nerves in this case to be a coördinated

(1) *Zeitschr. f. Augenheilk.*, p. 139, August, 1914.

phenomenon of thyroigenous auto-intoxication. He also reminds us that atrophy of the optic nerve may occur after treatment with thyroidin.

NEW INSTRUMENTS.

Shield for Graefe Cataract Knife and Angular Keratome. As all ophthalmologists know it is difficult to keep the edges and points in perfect condition on such delicate instruments as Graefe cataract knives and angular keratomes. In the process of sterilization the assistant or nurse is apt to allow them to strike the other instruments. The carrying of them in the case will sometimes permit them to slip forward, and in a multitude of

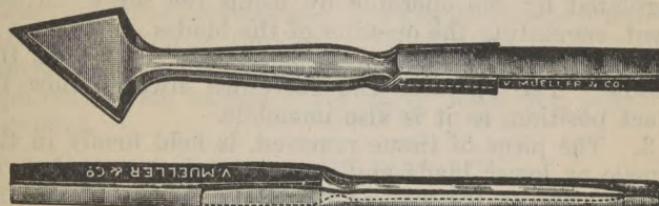


Fig. 37.—Shields for the Protection of Graefe Cataract Knives and Angular Keratomes.

ways their perfectness of finish is endangered. To protect them F. Park Lewis² has devised shields into which the instruments slip and in which they may be left when carried in the case and through the process of sterilization. These will also protect the instrument from contamination after being sterilized. The shields are very simple and light, being made of aluminum and scarcely appreciably add to the weight and bulk of the instrument. They have been made for the writer by V. Mueller & Co.

A Sclerectomy Punch. This punch consists of a handle (straight) measuring 3 in. to hinge of lever, and $\frac{3}{4}$ in. from the hinge of lever to the end of the lower or female blade; the lever is so hinged to the handle that when it is depressed, the upper or male blade is depressed into the lower, punching out a piece of tissue, which is

(2) *Ophthal. Rec.*, March, 1914.

held and can easily be removed by any pointed instrument passed into a fine fenestrum in this lower blade.

According to the inventor, John Hern,³ the advantages of this instrument over most of its kind appear to be:

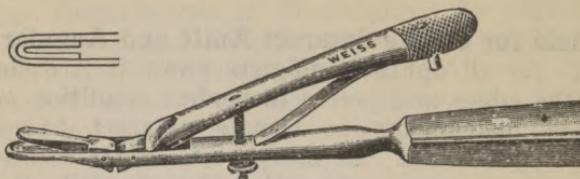


Fig. 38.—Sclerectomy Punch.

1. The size of the piece of tissue punched out can be regulated by the operator by using the screw adjustment, regulating the opening of the blades.

2. The lower blade is in a straight line with the handle. The operator can therefore always know its exact position, as it is also immobile.

3. The piece of tissue removed, is held firmly in the female or lower blade and can not therefore be lost in the interior of the eye, as sometimes happens with the trephine.

4. The simplicity of the instrument, thanks to Messrs. Weiss & Son, of London, who have faithfully carried out Hern's suggestions.

COMPARATIVE OPHTHALMOLOGY.

Experimental Investigations on the Alleged Color-Sense of Bees. The prevailing doctrine that the colors of blossoms attract bees has been tested by C. von Hess.⁴ He showed by various experiments that the statements of Lubbock, Forel, and von Frisch, according to which bees could be trained to certain colors, are erroneous. If different colors, under otherwise equal conditions, are made visible to bees, it is absolutely impossible to train them to, or attract them by, certain colors. So far not a single fact has, according to Hess, been produced, which could render probable the assumption of a color sense

(3) Ophthalmoscope, p. 148, March, 1914.

(4) Zoologische Jahrb., I, Vol. 31.

in bees, comparable to ours. Hess definitely disproved this by his former researches with spectral and glass lights, and again by his new experiments with colored papers. Hence the doctrine of Sprengel of the importance of the colors of flowers for insect visitors can not longer be defended.

The Occurrence of Cat-Like Pupils in Man. The occurrence of slit-like pupils in the human, similar to those found in the felines is the subject of an interesting article by R. Greeff.⁵ Four such cases have come under the observation of the writer, while he has been able to find but two others described in ophthalmic literature. In all the cases observed, there was a marked similarity in the pupils, the slit-like apertures varying only in their direction and extent. The pupils become round or almost so when in the dark. In all cases the pupillary apertures had acute angles at the extremities and the sphincter zone extended regularly about the pupillary opening.

(5) Arch. Ophthal., p. 146, March, 1914.

THE EAR.

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DISEASES OF THE EAR.

DEAFNESS.

Social and Economic Aspects of Deafness. In writing on this subject, I. A. Lederman¹ says that total deafness in the young child is far-reaching in that other important senses and in fact the entire personality of the child are invariably affected. That the development of speech depends on the possession of good hearing is unfortunately the most serious aspect; though it is true that instruction begun at an early age, and with proper intelligence, can do wonderful work in the training of the deaf child. Lip-reading as it is taught in modern institutions and by well-directed home training can educate the child to a partial and often quite considerable ability to atone for the absence of the natural hearing power. There is, however, lacking in the speech of such children the modulation and inflection, which give the voice its pleasing and musical quality.

In other respects, also, the deaf child is robbed of his due. The blank, often stupid expression of one thus afflicted is characteristic; it is recognized the moment he is ushered into one's presence. We can readily imagine the effect of deafness on the intelligence, temperament and character of the growing child. Shut off from the rest of the world by his inability to understand the happenings around him, he soon becomes morbid and suspicious.

The detrimental effects of partial loss of hearing depend on the degree of deafness. To catch a word here and there, often just sufficient to misunderstand, and obtain mistaken impressions and, to his chagrin, to discover his errors of perception or deduction can have no good effect on the nervous equilibrium of the

average individual. How much greater must be this deleterious influence on the nervous system of a child in process of development. The very effort to hear and understand when partial deafness exists constitutes a relentless strain on the nervous and physical powers. It is no wonder, then, that the afflicted child finds it impossible to advance equally with the normal child, of the same age, intelligence and opportunity. At school, this child will soon become weary and discouraged over the unequal struggle, and unless taken in hand early and assisted through some intelligent means such as individual instruction, will make an absolute failure of what may have promised to become a useful being. This unfortunate condition must arouse sympathy and our efforts to remove if possible or else to atone for this terrible handicap must be unremitting.

Home training by an intelligent and patient mother under the supervision of an expert or the employment of a private instructor is usually successful. The character of attention suitable to each child depends on its mental attainments. Those possessing normal mental power very readily are taught the art of lip-reading. Those of inferior aptitude for training are taught the combination of lip-reading, and sign language. It is claimed by teachers engaged in this most valuable branch of education that the child of superior mind is very quickly and readily made proficient. The average child requires a little more time and patience, but the end is certainly accomplished. Only the mentally defective have difficulty in mastering the oral method and children in this class require a long period of institutional training. Many of these institutions aim to teach more than the ability to hear and speak. They, in addition, prepare the student for some practical work in life by giving very thorough courses in manual training. In this manner they go far in solving the economic problem.

The most unfortunate of all are those who in addition to deafness are afflicted with blindness, partial or complete. But even the lot of these, hopeless as it may seem, is rendered bearable, by the development of the tactile sense. It is considered most essential that the child pos-

sessing even moderate attainments should be taught at home and should attend public school in specially arranged classes according to the degree of deafness and mental capacity.

Prevention of Deafness. In discussing the prevention of deafness J. B. Greene² divides the subject into two classes, congenital and acquired deafness.

Many cases which were formerly classed as congenital are now known to have been acquired in infancy. Sheppegrell, in his careful investigation of the subject, reached the conclusion that one-third of the cases of deafness are congenital and the other two-thirds acquired.

From a preventive standpoint, the acquired cases are of the greatest importance for it is here that the general practitioner and special practitioner, by working hand in hand, can render the greatest service to mankind. In his opinion there is no one cause so productive of defective hearing in children as adenoids. This lymphoid structure is situated on the vault of the pharynx, in close proximity to the mouths of the Eustachian tubes. Adenoids not only prevent ventilation of the tube and ear but also, when inflamed, become a fruitful source of infection which readily extends along the tube to the middle ear, causing an attack of acute otitis media. The passage of bacteria to the middle ear is especially easy in infancy on account of the shortness of the tube and its relatively large size. This inflammation, if not arrested, may not only extend to the mastoid cells, but may also involve the internal ear or the meninges of the brain. It not only endangers the organ of hearing, but endangers life. Ballenger was not far wrong when he said that 68 per cent of middle-ear diseases are due to adenoids. It is not necessary for adenoids to cause mouth breathing, though they usually do, it is found, if the matter be carefully inquired into, but they are harmful on account of harboring infection and preventing ventilation and drainage of the Eustachian tube and middle ear.

Other important causes of acquired deafness are the acute exanthemata, scarlet fever, and measles heading

the list. Smallpox in times past was a fruitful source of deafness but, thanks to preventive medicine—vaccination—it claims few victims at the present time. Typhoid fever and diphtheria are also better treated and controlled, to the saving of many organs of hearing. In all the acute exanthemata, particularly in children, the ears should be regularly inspected and when the condition requires it, the drum membrane should be fully incised to permit drainage. It is most unfortunate when the first symptom of acute otitis media noted by the family physician is a running ear. Not only permanent damage to the organ of hearing, but also mastoiditis and meningitis may be prevented by timely incision of a drum membrane.

Influenza, pneumonia and whooping-cough may cause deafness through infection of the middle ear. The only prophylaxis is incision of the drum membrane at the right time.

Meningitis may cause deafness of the worst kind, usually through infection of the internal ear from the meninges. In the cerebrospinal type of this disease, Flexner's serum should be used promptly.

Tuberculosis of the middle ear is very difficult to prevent or cure. Mumps causes deafness by attacking the internal ear. It is very serious but, fortunately, this complication is rare. Such drugs as quinine and the salicylates, including aspirin, should be given with caution, as excessive doses may produce a form of nerve deafness.

Syphilis may cause deafness by involving the nerve or labyrinth in the early stage of the disease, or it may occur late in the disease. It is also a cause of congenital deafness; at least the inherited deafness occurring during infancy or childhood. The preventive measure is administration of salvarsan, or neo-salvarsan, followed by mercury and the iodides, controlled by the Wassermann reaction. Some excellent authorities speak of the harmful effect of salvarsan on the already affected auditory nerve, but the weight of evidence is in favor of its use as less dangerous than the *Spirochaeta pallida*.

Etiology and Treatment. P. D. Kerrison⁴ gives the

(4) Jour. Amer. Med. Ass'n., Jan. 9, 1915.

following as the usual causes of deafness due to non-purulent conditions:

1. Deafness due primarily to a lesion of the labyrinth or auditory nerve: Such lesions are fortunately rare as compared with those of tympanic origin. They are not amenable to local treatment.

2. Deafness due to otosclerosis: Whether this lesion is confined to the bony capsule or invades the membranous cochlea, the deafness is not influenced by local treatment.

3. Impairment of hearing due to obstructive lesions of the Eustachian tube: Functionally, these cases are characterized by moderate impairment of hearing, changing noticeably with external conditions (weather, etc.); and responding favorably and more or less permanently to effective treatment of the nasopharyngeal and tubal lesions.

4. Impairment of hearing due to chronic hypertrophic otitis media: In this lesion the mucous membrane lining the entire tubotympanic tract is thickened and congested. Hearing is improved by rational treatment of the Eustachian tubes, but rarely, if ever, regains the normal standard.

STAPEDIAL FIXATION: Fixation of the stapes may be primary or secondary: It is primary when due to morbid changes which bind the foot-plate or crura of the stapes directly to the margins of the oval window or niche; it is secondary when the stapes, though free within the oval window or niche, is nevertheless immobilized through fixation of the malleus or incus, or both.

The type of deafness does not seem to vary materially with the particular section of the ossicular chain which is bound within the tympanum, nor with the nature of the mechanical obstacle to free ossicular movement; that is, provided the net result is to prevent transmission of sound waves to or through the foot-plate of the stapes. On the other hand, evidence is not wanting that deafness due to direct stapedial fixation is less influenced by treatment of any kind than is deafness of the same grade and type resulting from checks on ossicular mobility not centered in the fenestro-stapedial joint.

The most characteristic and, so far as local treatment is concerned, the most hopeless type of direct fixation of the stapes is that which occurs in otosclerosis.

Excluding suppurative lesions, the following tympanic conditions may be mentioned which not infrequently lead to ossicular rigidity or fixation:

1. As a result of prolonged subacute exudative inflammation of the tube and tympanum, the tubotympanic mucosa undergoes marked thickening. According to Politzer, the labyrinthine windows are selective regions in which the hypertrophy, or in some cases actual deposition of new connective tissue, is often particularly marked. Theoretically, it is conceivable that this process in the region of the oval window may reach a stage causing great reduction of stapedial mobility, later, under treatment or without it, undergoing recession with partial or complete restoration of hearing. This, Kerrison is convinced, is a process which explains the considerable and permanent gain in hearing which follows rational treatment in some cases.

2. As a result of prolonged tubal catarrh, with deflation of the tympanum, permanent contraction of the tensor tympani muscle may react unfavorably on the movements of the stapes by reducing the mobility of the entire ossicular chain.

3. In the course of a chronic or subacute tympanic inflammation of long standing, with occasional acute exacerbations, adhesive bands are formed between the head and crura of the stapes and the walls of the oval niche; or between the head and crura of the stapes and the long arm of the incus. Similar bands may bind the long arm of the incus to the inner tympanic wall; or, occurring in the vault, may bind the head of the malleus and body of the incus to the outer bony wall of the attic. These bands may represent folds of normal mucous membrane which, during acute inflammatory change, becoming adherent, are later converted into fibrous bands, these ultimately undergoing strong and permanent contraction.

An experience of years with catheter-inflation has convinced Kerrison that the frequent routine use of the catheter as a means of correcting ossicular rigidity is

based on a false conception of the mechanism involved. The theory on which it is used is, of course, obvious, *viz.*, that the act of inflation moves the drum membrane, and with it the ossicles, thereby tending to restore their normal mobility. The beginner in otology is often enthusiastic over the distinct functional gain following a first or second inflation, and is at a loss to explain his failure by the same means to obtain continued and progressive improvement of hearing. The explanation of this phenomenon is that the first few inflations in the case of an individual whose ears have not been under recent treatment often do result in the breaking or at least the modifying of small intra-tympanic adhesions, with consequent improvement of sound transmission. If continued as a routine measure, the force of the inflations are exerted more and more in the direction of stretching the drum membrane while exerting progressively less influence on the ossicular chain. Used too frequently or too forcibly, and continued over a considerable period of time, the net result is a disturbance of the tone or balance of the conducting mechanism far outweighing the influence of the comparatively small passive movements of the ossicular chain. There is no question that the victim of chronic middle-ear disease may suffer further permanent disturbance of function as a result of excessive or irrational routine catheter inflation.

The first rational indications of treatment having been carried out, there remains in these cases a variable degree of residual deafness which represents the real problem of the disease.

In relation to the treatment of the Eustachian tubes, there are two time-honored superstitions which Kerrison says should be dispensed of. The first is that the passage of a current of air through the tube from the catheter or Politzer bag exerts any permanent therapeutic influence on a chronically diseased tube; and the second is that the use during inflation of medicated vapors—*e. g.*, merthiol, ether, iodine, etc.—exerts any alternative and beneficial action on the tubal mucosa. Evidence of the value of either of these agents, so far as chronic tubal lesions are concerned, is wholly wanting.

In the author's experience, the treatment having the widest scope of usefulness in chronic tubal lesions is the local application of the silver preparations, chiefly argyrol and silver nitrate. Yankhauer's method of first cocaineizing the entire length of the tube and then making direct application of a 25 per cent. or 50 per cent. solution of argyrol, also throughout the length of the tube, gives the best results.

As to the influence of inflation in advanced tympanic deafness: If a first inflation is followed by an appreciable improvement of hearing, this may be accepted as an indication that the ears should be inflated at short intervals—preferably on alternate days—until the maximum functional gain shall have been reached. Progressive improvement can rarely, if ever, be carried beyond the third, or possibly the fourth inflation. Beyond this, if the inflations are continued at short intervals and over any considerable period of time there is likely to occur an ultimate recession, or loss, of hearing power, due to a loss of the normal tone or tension of the drum membrane.

The subjective phenomena following inflation are such as render it difficult for either the physician or the patient to differentiate with certainty between the immediate and the ultimate results. In many cases following inflation the walls of the membrano-cartilaginous tube fall again into contact, their congested condition serving to maintain for a time a positive air pressure in the tympanum. While this lasts, the patient experiences the sense of relief and clearer audition dependent on the more normal position of the drum membrane. As soon, however, as the air in the middle ear is absorbed, the drum membrane resumes its retracted position. Frequent or injudicious repetition of inflation brings further abnormal relaxation of the membrane, with more pronounced retraction, and a progressive loss of hearing. The initial results of inflation are sudden and therefore clearly appreciable; the ultimate results of prolonged routine inflation are gradual, insidious and therefore difficult to gage.

Kerrison's own experience and belief are that more of actual and permanent functional gain can be accom-

plished through treatment directed solely to the diseased lining membrane of the Eustachian canals, than can ever be obtained by routine catheter inflation.

MIDDLE EAR.

Exudative Catarrh. I. D. Kelley⁷ believes that no class of ear diseases deserves more consideration and a better understanding from the general practitioner, and even the aurist, than exudative middle-ear catarrh, first, because of its vague symptomatology and seemingly uncertain signs; second, owing to the dire results produced in patients because of the early neglect in recognizing these conditions, and a failure to employ the simple methods of treatment. There are cases typifying this neglect; children whose hearing has become so poor that they are classed as mental defectives; mental defectives, who after proper treatment can again be admitted to the grade schools; young adults virtually incapacitated and older persons exhibiting high grade, chronic, adhesive catarrhal processes as a result of early neglect; finally, one patient lost his life because of this accumulative deafness. Exudative middle-ear catarrh is a distinct entity, both clinically and pathologically.

Clinically it is divisible into (1) acute, (2) sub-acute, (3) chronic; pathologically into (1) serous, (2) mucous, (3) exudative catarrhs, the end stage of a middle-ear suppuration, (4) a chronic adhesive catarrhal process.

Anatomically, middle-ear catarrh occurs with a swelling of the mucous membrane, and accompanying this, in beginning cases, a clear bright yellow colored serous exudate. In other and more chronic cases, there are different grades of mucous exudate. Microscopic examination reveals a small number of mononuclear leukocytes and mast cells with many forms of degenerated bacteria, and lastly, a more or less distinct organization of the exudate.

The etiology of middle-ear catarrh is varied. The most frequent causes are; acute or chronic changes in the nasopharynx, resulting from adenoid vegetations; inflammations of the pharyngeal tubal openings from syphilis, tuberculosis, etc.; hyperemia and catarrhal

changes in the Eustachian tubes, producing disturbances in the normal ventilation of the middle ear, leading, sooner or later, to middle-ear catarrh; traumatic injuries of the membrana tympani, middle ear or tube; gaseous vapors; middle-ear inflammations and, lastly, the reactive inflammation following operative procedures on the ear, nose and throat.

The symptoms of acute and sub-acute exudative middle-ear catarrhs are: a rather marked impairment of hearing (from 1 to 3 meters for the whispered voice instead of the normal 20 meters) occurring shortly after the onset of the disease, lateralization of the patient's speaking voice to the side affected, subjective noises, together with a feeling of fulness and pressure in the ear and, when the middle ear is not entirely filled with fluid, a sensation as though water were in the ear when the head is moved.

The most important clinical finding is the diminution of hearing on the affected side, and this can not be too greatly emphasized because of its important relation to the treatment and the simplicity of its use as a test. There are present in these cases a marked diminution in the hearing distance for the whispered voice, and a lateralization of the tuning forks to the affected side. Exudative catarrh as the end-stage of a middle-ear suppuration presents the otoscopic picture of a serous or mucous catarrh; usually, however, of the latter type, because of the fact that a suppuration passes into the mucous stage before healing. The last and final outcome of these conditions is the chronic adhesive process, with its marked, permanent impairment of hearing, a thick, opaque, retracted drum bound down to the promontory by interlacing connective tissue bands formed from an organization of the inspissated mucous within the middle-ear cavity, and lastly a stenotic Eustachian tube.

To treat these cases properly they must be recognized in their earliest stages, before definite anatomic changes have occurred, in other words, before a chronic adhesive process has been reached. One must not wait until intensive symptoms develop, usually only marked deafness, before beginning active treatment, because then it

is too late. As a prophylactic measure against this condition, children exhibiting a tendency to otitic catarrhs should have their noses and nasopharynges put into normal state by the removal of adenoids and correction of abnormal nasal conditions.

The catarrhal ear condition itself is treated by air inflation, either by politserization or catheterization and massage, such inflation being controlled by the hearing distance for the whispered voice. The most important phase of the treatment is when, after inflation in acute and sub-acute cases, the hearing for the whispered voice is not improved beyond one meter a paracentesis must be resorted to, and as often as the hearing distance falls below one meter, thus allowing the serum or mucous to escape through the drum perforation.

Chronic Catarrhal Otitis Media. S. H. Lutz⁸ makes a plea for better instruction of patients suffering from chronic catarrhal otitis media. They should be instructed and advised in reference to hygiene and diet, methods of ventilation and manner of dress. A careful history of their general condition as well as their ear condition should be obtained. Patients must be impressed with the necessity of giving to the aurist detailed information in regard to their general health. It requires more than a number of visits to the office of the aurist and the after a time more or less perfunctory inflations for patients to obtain the help they are seeking.

Abnormal conditions in the nose or sinuses, with the consequent poor drainage, extension of inflammatory processes from these to the tube mouth, obstruction by the presence of adenoid masses or enlarged posterior ends, or by cicatricial remains due to attempts at removal of adenoids, mucus deposited in the fossa of Rosenmüller, paralyses of, or other interference with the action of, the levator palati and the tensor palati, are all causes of the deafness which we call chronic catarrhal otitis media.

A deviated septum may not always interfere with inspiration or expiration, nor will a diseased accessory sinus of itself directly always cause trouble, but either of these conditions will accumulate or retain mucus, and

effort to dislodge the accumulations will almost certainly involve the ear sooner or later. Any blocking in the nose or nasopharynx interferes with the normal action of the tubopalatal muscles, and therefore the ventilation and drainage of the tube is impaired.

Pressure at localized points is a cause of circulatory disturbance, particularly in the venous return from the middle turbinate and Eustachian tube, which empty into the veins of the pharynx, and by this imbalance congestion of the tube lining and of the mucous membrane of the drum cavity results, with swelling of the lining and diminished caliber of the tube. Later, as a result of impaired ventilation and drainage, exudates form and are retained in the tube and in the cavity of the tympanum, and also in the area surrounding the tube mouth. This exudation and congestion in the nasopharynx causes the formation of masses of mucus which are hawked backward or blown forward. These acts cause rarification or pressure in the nasopharyngeal cavity; exhausted or rarified air in the nasopharynx allows greater pressure on the drum from without, and imbalance is the result; this difference in air pressure is exerted on the tubes and on their control muscles. The trouble begins at this time from the frequent efforts to clear the posterior nares. Violent blowing of the nose, the suction and pulling to aspirate the mucus backward, cause the muscles to stretch, recover, stretch again, and this is done repeatedly. Gradually the tube mouth is distorted and becomes a receptacle and retention chamber for infection-laden mucus to further the process already begun.

We know that careful well-done nasal surgery, will often stop the progress of the ear involvement by providing a fairly natural open air channel with a fair return of muscular control of ventilation of the tympanic cavity.

Whatever way is used, do not allow the least pressure on the nose to interfere with both nostrils being cleared at one and the same time.

If the mouth can be slightly opened while blowing, there can not be any amount of back pressure toward the Eustachian tubes.

Relaxed Ear Drum. Harold Hays⁹ thinks that the majority of otologists are wont to consider that almost all cases of deafness are due to a catarrhal condition causing retraction of the drum, or to a stiffening of the ossicular joints. Up to a few years ago, he also was under that impression and treated the majority of his cases by the usual method. It was only after prolonged examination, and by the careful use of an electric oto-scope, to which a massage apparatus could be attached, that he began to notice that in many cases of deafness the drum, although retracted and thickened, was often at the same time relaxed. He made up his mind to study this situation from every angle until he found to his surprise that at least 50 per cent. of the patients consulting the otologist suffered more from a relaxed drum membrane than from a retracted one. One does not have to be much of a physicist to realize that it is an impossibility for true sound waves to be conveyed through a drum which is diminished in tension. Hays reasoned (as he has found others have reasoned too) that a relaxed drum will cause a relaxation of the entire ossicular chain, and that in all probability the ligament of the oval window had lost its tension, and that the hearing of sound waves was interfered with. One peculiar symptom which struck him in many of the cases was that those patients had paracusis Willis—in other words, that they could often hear better in a noisy than in a quiet room. This had always seemed one of Nature's paradoxes and until the present time had not been satisfactorily explained. Hays believes that this paracusis can be accounted for by the fact that ordinarily the ligament of the oval window is relaxed, but that when there is a great noise the increased tension exerted on the muscles of the middle ear, that is on the tensor tympani and the stapedius, results in a more proper tension being created within that small cavity.

When he first began to observe these manifestations the question arose as to what could be done to alleviate the condition, and it occurred to him that if some solution which would excite an inflammatory reaction could be injected into the middle ear, a two-fold result would

be accomplished. In the first place, when the inflammation subsided there would be such a stretching of adhesions that the ossicles could more easily assume their former position, and in the second place, the resultant irritation to the drum would tend to draw it more tightly together. He first made these injections directly into the ear by inserting an ureteral catheter through the Eustachian catheter, and injecting various medicaments through this little tube. He first tried fibrolysin in the hope that the direct application of this medicine would have a tendency to dissolve the adhesions. Finding that this was not so and that any antiseptic solution would do as well, he injected a small amount of 10 per cent. argyrol in this manner. In order to ascertain the amount of solution he injected, he applied the sounding tube to his own ear, and measured the amount injected by observing the sound when the solution first went in, and keeping on with the injecting until the patient felt a sensation of pressure. About 0.5 c. cm. was usually sufficient.

Certain definite symptoms were observed after this treatment. Many patients would become dizzy and sometimes nauseated, due to interference with the labyrinth by pressure on the oval and round windows. Within the course of a few hours a severe inflammatory reaction would set in, which often laid the patient up in bed for one or two days with fever and pain. A transudation of serum would take place through the drum. Much to Hays' surprise, within the course of a few days, the discharge would stop, and the patient's hearing would be remarkably improved. However, the improvement was temporary, and he felt himself at a loss to proceed further.

As stated, the principal thing to do is to bring back the drum to its proper tension and to tighten the ligaments between the ossicles by creating an inflammatory reaction, which when it subsides will not have created any particular harm, but at the same time will have created a certain amount of connective-tissue infiltration. That no harm is done in attempting a procedure of this sort is mainly attested by the fact that nearly all the patients that the author has treated in his way have

had no impairment of the hearing mechanism and have improved beyond any hope that he may have anticipated.

Earache and Acute Otitis Media. Irving Sobotky² thinks that the general practitioner does not appreciate the significance of earache.

By far the most common and the most dangerous cause of earache is acute otitis media—dangerous, because it can rapidly develop into a mastoiditis and a meningitis, especially in children. That is the reason why it must be recognized and treated at once; why every effort must be made to detect the tenderness on pressure that is present when the mastoid antrum becomes involved, and why the case must be referred to a competent otologist the instant there is the slightest evidence of the existence of this mastoid tenderness. Only an otologist is capable of treating mastoiditis.

In order to recognize the condition causing the pain, the physician must be familiar with the normal appearance of the tympanum and thus be able to compare it intelligently with the picture presented by an acute otitis media.

Before examining the patient, however, these three questions can be asked: How long have you had the pain? Did the pain keep you from sleeping? Is there any discharge from the ear? The first question gives the examiner some idea of the duration of the infection; the second is a measure of the severity or intensity, and the third raises the question of sufficient drainage.

A satisfactory examination of the ear can not be made unless the ear is thoroughly wiped free of any cerumen or secretion, but it must be borne in mind that this cleansing will produce some hyperemia, both of the tympanum and of the auditory canal.

The picture presented by the affected tympanum should now be compared with the normal. If the tympanum is of a scarlet red shade and bulges into the auditory canal and the long process of the malleus is invisible a diagnosis of acute otitis media (suppurative) can be made.

However, it is not always easy to make the differential diagnosis between a suppurative and a catarrhal otitis

media, especially in the early stages. As a rule the pain is much more severe and the temperature from one to two degrees higher in an acute suppurative otitis media.

As in abscess formation in other parts of the body, complete drainage of the middle-ear cavity must be immediately established by means of a free, curved incision of the tympanum, or in other words, a paracentesis must be done even if the ear has commenced to drain.

After sterilizing the knife, the ear speculum, and the hands, the index finger of the left hand should be placed in the convolution of the auricle, just above the external meatus and traction exerted in an oblique direction, upward and backward in adults, and downward and slightly backward in children. This straightens the canal. With the patient's head firmly held, the knife should be introduced along the posterior part of the floor of the canal, with the cutting edge directed upward. With an absolutely clear view of the tympanum the curved incision should be made in the posterior quadrant by puncturing the tympanum almost at the lower border of its attachment and incising from below upward.

Nasopharynx and Middle-Ear Disease. E. L. Jones³ believes in vigorous medicinal treatment of the nasopharynx for its effect on the Eustachian tube and middle ear.

The cavities of the temporal bone may be looked on as accessory cavities of the rhinopharynx, which by chance happened to contain the organ of hearing, with its complex and vital surroundings. Thus sheltered, the only gateway for bacterial invasion is the Eustachian tube, and if this be guarded, few germs are apt to find entrance by the blood-channels. From time immemorial, the dependence of otitis on acute coryza, and pharyngeal infections—whether tonsillitis, diphtheria or the exanthems—has been recognized, and for a generation or more its association with adenoids and grip has been known; but the latent infections from the rhinopharynx, where none of the preceding conditions have been manifest, are only now being recognized.

In all cases, whether acute, subacute or chronic, and regardless of the specific cause, the rhinopharynx is

(3) Jour. Amer. Med. Ass'n., Jan. 1, 1915.

mopped, or rather forcibly scrubbed out, with a mixture of phenol, tincture of iodine and glycerine, to which camphor and menthol have been added, of sufficient strength to set up a violent reaction, with painful sore throat, lasting from part of a day, to several days. Patients rapidly become accustomed to the effect so that after half a dozen applications this treatment causes only a passing discomfort. Adults and children are given the same treatment, though in infants under three years old the mixture is weakened. When compressed air is available, self-restraining patients have the nostrils sprayed with a camphor-menthol-iodinized oil—otherwise it is swabbed through the lower meatus on each side, and back to the upper throat on cotton carriers; and the strength is decidedly more.

Two formulas are used: First, fifteen grains each of camphor and menthol are rubbed to a liquid; then 1 dram of compound tincture of iodine, 2 drams of alcohol, and glycerine to make 1 ounce are added. This is called camphor-menthol compound. For spraying it is diluted with nine volumes of hydrocarbon refined oil.

The second formula is 1 part phenol, 1 part tincture of iodine saturated with potassium iodide, and 2 parts glycerine.

For swabbing, a fair sized cotton mop is fixed in a strong curved Sims carrier, which is made of nickeled spring brass, or the Ayres modification, made of steel, dipped first in the iodine solution, squeezed against the bottle neck to remove excess; then dipped in the camphor and menthol compound and rubbed against bottle neck only sufficiently to prevent dripping. It is quickly thrust behind the palate until it strikes the vault of the pharynx, and then forcibly rubbed from side to side, unless the palate muscles prevent moving it, in which case it is forcibly pressed where it rests. Jones considers it important to use force in this procedure, as though it were intended to lift the patient bodily on the instrument; hence the need of a heavy stout instrument, and not a bent wire, or other device not permitting great force.

In the painful stage of acute inflammation, or in the acute catarrhal stage, without pain, the nostrils are

sprayed or swabbed with a few drops of a 2 to 4 per cent. solution of some local anesthetic and from $\frac{1}{2}$ to 1 drop of 1 to 1,000 epinephrine solution. This not only contracts the vessels, but it is believed that the sedative effect of the anesthetic on the sensory nasal nerves exerts a beneficial influence on the vasmotor nerves supplying the inflamed areas; this is then followed by the camphor and menthol compound to the nose and the iodine solution to the rhinopharynx. This treatment is made only once in twenty-four hours, and the patient is not given any nasal spray or throat wash whatever. The only local measure for home use is the hot-water bottle. If the tongue is coated, a good dose of calomel, followed by salts is ordered; if not coated, the salts only.

Otitis Media in Infants. E. E. Woodside,⁴ in discussing otitis media of infants from the general practitioners' standpoint, believes that practically all unfavorable sequels can be prevented by early and appropriate treatment. The responsibility rests mainly on the family physician, as it is to him the parent usually applies first for relief.

The occurrence of otitis media in infancy is principally favored by the anatomic conditions of the auditory duct and by the greater prevalence of adenoid tissue around the mouth of the duct. The Eustachian tube of the infant is a short, wide and relatively horizontal canal, the pharyngeal orifice of which lies a little behind the choanae and on a level slightly below that of the hard palate. Its physical characteristics seem, therefore, as compared with the adult tube, particularly favorable to the entrance of germs from the nasal secretion draining posteriorly into the pharynx and to the development of vascular changes as a result of any pathologic condition within the nose or nasopharynx.

Named in order of their importance the exciting causes of acute otitis are:

1. Nasopharyngitis—the coming “cold in the head”; more cases are secondary to this affection than probably any other.
2. The acute exanthemata: scarlet fever, diphtheria and measles cause acute tympanic disease with

(4) Illinois Med. Jour., February, 1915.

greater frequency than we sometimes believe. Scarlet fever causes more cases than the other two and more of its cases go on to mastoid involvement. Acute influenza gives rise quite frequently to middle-ear disease of a severe type.

3. Hereditary constitutional affections such as tuberculosis, syphilis, rachitis and alcoholic heredity.

4. Traumatic injury of the middle ear before and during birth.

5. Coughing, sneezing and vomiting, forcing foreign substances through the tube into the tympanum.

A long list of microorganisms have been found in the secretions in otitis. Named in order of frequency are streptococcus, pneumococcus and *Streptococcus mucosus*, *Staphylococcus albus* and *aureus*, *B. proteus* and *B. pyocyaneus*, etc.

As regards virulence, there is no room for doubt that the streptococcus and pneumococcus give rise to a middle-ear involvement which leads more frequently to intracranial complications than any of the others. It has been held that the staphylococci do not cause intracranial complications, which is an extreme view, but it is certainly rare compared with those due to streptococcus and pneumococcus infections.

When acute otitis occurs as a complication of one of the acute infectious diseases, the otitic symptoms may be masked by the general disease. When, on the other hand, the otitis is not secondary to systemic infection, the onset is usually sudden and clearly defined. As a prodromal symptom, which may be noted by older children, a sense of fullness may occur. Usually, however, the symptom first noted is that of pain. The ear-ache is generally sudden in its development. Following a few premonitory twinges, it soon assumes a character of constant pain which rapidly reaches an unbearable degree of severity. Not infrequently the patient retires at night with no noticeable discomfort, to be awakened during the night or toward morning by the severity of the ear pain. Once established the pain is usually constant but is subject to exacerbations of intensity. With the beginning of pus formation the pain becomes "throbbing" or "drawing" in character. The

severity of the pain often distracts the patient's attention from the minor symptoms. If questioned, however, he usually becomes conscious of subjective sounds; tinnitus aurium. The hearing is impaired.

With infants and young children even the mildest type of middle-ear infection is usually announced by rather high fever, varying from 102 to 105 F. Digestive disturbances are common during the early stages of acute otitis.

The possibility of overlooking an inflammation of the middle ear is increased by the helplessness of the infant. It is not before the fourth month that the infant directs attention to the possibility of an auricular infection by rubbing its ear, putting the hand to the head, crying when the ear or its vicinity is touched or even avoiding lying down on the affected side. Exacerbation of pain when sucking often interrupts the feeding, the patient giving vent by crying. Up to that age, however, all motor reaction may be absent and the diagnosis only cleared up when a discharge of pus is found in the external canal. Sometimes it takes as long as ten days or two weeks for the tough membrane to become ulcerated and to rupture.

The treatment of infantile otitis hardly differs from that of adults. Early paracentesis is important, as its omission may be responsible for mastoid and intracranial involvement.

The paracentesis should be more than the simple stab of a needle. It should be a full free incision beginning well up to the posterior fold and extending downward through the inferior margin of the membrane and into the skin and periosteum of the floor of the external canal. A general anesthetic, preferably with nitrous oxide gas is essential to good results.

After paracentesis it is important to keep the canal free of pus by syringing frequently with warm sterile solutions of normal salt and by traction by sterile gauze wicks carried down to the opening in the drum.

Non-operative treatment is indicated in a very small percentage of the cases and in the very earliest stages of others. The so-called abortive treatment may be tried when the case is seen very early before there is any

bulging of the membrane. This treatment is to put the child to bed, induce free catharsis and give liquid diet. Syringe the external canal freely with hot normal saline. Fill the cavity half full of hot 5 per cent. phenol in glycerine. The usual ear drops of sweet oil and laudanum and all other oily preparations should religiously be kept out of the ear. Heat is very grateful to the patient when applied to the ear in any form. A good prescription is chloroform and olive oil equal parts. About a teaspoonful poured on a large piece of cotton and held over the external canal will many times work wonders in relieving the pain.

Woodside formulates the following conclusions:

1. Acute otitis media in children is a common disease. It is sometimes primary but most often secondary to a general affection or to an acute process in the nasopharynx.
2. If the physician keeps in mind its possibility in unexplained febrile affections of childhood and uses sufficient care and patience in the otoscopic examination the diagnosis is easily made.
3. The treatment is simple and easily applied and if begun early enough and properly used, the usual result is excellent.
4. In cases seen late that have been neglected or improperly treated, the result may be mastoid infection, meningitis, brain abscess, chronic discharging ear or permanent impairment of hearing.

Treatment of Middle-Ear Disease. John W. Durkee⁵ believes that little can be done to prevent involvement of the middle ears; but much can be done in their treatment. As the infection passes from the nasopharynx along the Eustachian tube, the first thought would be to keep the nasopharynx clean. This can not be done, but if the child is old enough or easily managed, an alkaline solution may be used, in an atomizer, or dropped in the nose with a medicine dropper, the head being held back until the solution reaches the pharynx. This, followed by a mixture of menthol and camphor in a mineral oil used in the same way, may remove some of the secretion and lessen the inflammation in the nasopharynx to a

(5) Long Island Med. Jour., December, 1914.

slight degree. But if the child struggles and resists the use of the alkaline solution the atomizer should be omitted, and only the menthol and camphor in oil, dropped in the nose with a medicine dropper, should be employed. In the cases of nasopharyngeal diphtheria in which it seems necessary because of the large amount of secretion, to cleanse the nose, the child should be laid on the side with the head over the edge of the bed, and with a small syringe the solution should be gently forced into the upper nostril and allowed to flow out of the lower one. Never use a nasal douche. It is a positive danger and very apt to cause infection of the middle ear. The patient should not be allowed to blow the nose forcibly, but should blow it into the handkerchief while both nostrils remain open.

The examination of the ears should not be postponed until the patient complains of pains, a discharge is seen in the canal, or a swelling appears behind the auricle. The ear drums should be inspected daily, or, at the longest interval, every other day. A head mirror and speculum, or a speculum carrying an electric light, should be used. At the first appearance of bulging of the drum a free incision of the bulging portion should be made. By making this incision under nitrous oxide anesthesia a much better operation can be done, the patient suffers no pain, and his future trust and confidence in the physician are not shaken; an item that makes the further treatment of the case much easier. After the incision, the ear should be syringed every two hours, using each time, a full pint of a boric acid or a weak carbolic acid solution. When syringing the ear, the canal should be straightened by holding the auricle back or down, depending on the age of the patient. The point of the syringe, either a two-ounce soft rubber one, or a fountain syringe to which a medicine dropper has been attached, should be placed well in the canal, and the solution forced in rather hard in order to remove the discharge from the depth of the canal. No cotton should be worn in the canal while the ear is discharging. If a discharge appears in the canal before the drum is incised it probably means that the drum has ruptured, but it does not mean that the drainage of the

middle ear is sufficient. The ear should be carefully examined and, even though a perforation of the drum is found, if the drum is bulging it should be incised and the ear syringed. The mastoid should be watched for tenderness and if mastoiditis develops an operation should be done early.

The duty of the pediatrician to his patient does not cease with the disappearance of the rash. If there is still a discharge from the ears, they should be treated for weeks or months in an effort to stop it. If there has been a discharge and it seems to have stopped, the physician should not be satisfied until the ears have been carefully examined, because there is often a slight discharge that collects in the depth of the canal but is not enough to appear externally. The dangers of a discharging ear should be carefully explained to the parents, and they should be told that, during the rest of the patient's life, the ears should be treated or, at least, inspected, at regular intervals. If, later, it is seen that the patient is deaf, he should be placed in a school where he can be instructed in lip reading. If this is done when he is young, he will, when older, be in a position to earn his own living, and not be a charge on his relatives or the state. He will also find that he is able to enter into many of the pleasures of life that, without this instruction would be closed to him. Only when we have done this, have we done our full duty by our patients.

Operative Treatment of Suppurating Otitis Media.
J. L. Lougee⁶ has operated on twenty-five patients with suppurating ears by attempted closure of the Eustachian tube according to Yankauer's method. The operations were performed at the Massachusetts Charitable Eye & Ear Infirmary, during 1913, by courtesy of Drs. Crockett and Mosher. The duration of discharge has ranged from two to thirty-five years, with an average of sixteen years. The Roentgen ray has shown nearly all of the mastoids sclerosed, the sclerosis varying in degree from a slight density to complete obliteration of the cells. Dr. Mosher's transilluminator, showed little light passing through the mastoid.

All the patients were given a hearing test before

operation. Most of them were suffering from some pathologic condition of the nose or throat, from which the ear trouble undoubtedly had its origin.

The operation consisted of denuding the bony Eustachian tube as far as the isthmus. The ossicles were not removed, granulations were not disturbed, and no medication whatever was used. Postoperative treatment consisted in wiping the ear dry several times a day. Three patients complained of dizziness following the operation, one of them was admitted to the hospital, and remained in bed about two weeks. The dizziness gradually disappeared.

The radical mastoid operation has been performed on four of the patients since the tube was curetted. Two of these had a very foul discharge containing flakes of cholesteatoma, with no apparent improvement from operation. The other two developed symptoms of acute mastoiditis about two months after curetting the tube. The mastoid operation disclosed a large antrum containing cholesterol and pus.

In three of the cases, the tube was curetted a second time, and the remaining ossicles and outer attic wall were removed. In two cases the nasal septum was straightened and the nasopharynx curetted. Ten months have elapsed since the first operation, and about seven since the last, with an average of about eight and one-half months.

Many of the tubes have opened and closed several times since operation. Several cases in which the ear has been perfectly dry, at least once since operation, now show a profuse discharge.

Bands of adhesions extending from the anterior portion of the tympanic ring to the promontory were noted in three patients. In most cases the granulations showed a tendency to shrink down as the ear became dry, although the tube remained open.

A second hearing test was made on eleven patients. Five showed slight improvement in air conduction. The patient showing the most marked improvement increased from 8/35 to 2/25 voice sounds, and from 128 to 64 fork. There was no improvement in the remaining patients tested.

Recent examination of these patients discloses the following conditions:

Tubes open with granulations and discharge.	11 cases
Tubes closed with ear discharging.....	1 case
Tubes open with ears dry	8 cases
Tubes closed with ears dry.....	1 case

Out of the twenty-five patients, in but one has the tube remained permanently closed with ear dry.

Of the tubes reported open with ears dry, three have been curetted a second time and in two other cases the nasal septum has been straightened and adenoid tissue removed.

A certain percentage of chronic mastoids with cholesteatoma will eventually require a radical operation to bring about a cure. In this type of case curettage of the tube may, as a result of the reaction in the middle ear, cause an acute mastoiditis, as in the two cases noted above.

After eliminating cases of chronic suppuration, in which the radical operation is necessary, we have remaining a class of cases in which former treatment has been the removal of sloughing ossicles and polypi, together with the correction of pathologic conditions of the nose and throat.

Tuberculosis of Middle Ear. H. H. Briggs⁸ classifies the causes of tuberculosis of the ear as immediate and predisposing. Among the predisposing factors may be classed general debilitating diseases, the hereditary influence of tuberculosis, syphilis, association with tuberculous individuals, unhygienic environment, over-crowding, poor food, cachexia; in short, any condition of surroundings, or constitution which induces a lowering of the systematic power to combat infection.

FIRST: Existence of a tuberculous lesion elsewhere in the body, especially pulmonary phthisis with cavitation, and tuberculous disease of the glandular and osseous systems; the former in adults, the latter in infants and children:

It is noteworthy, in this connection, that tuberculous ear disease of adults in whom phthisis with cavity

(8) *Ann. Otol., Rhinol. and Laryngol.*, September, 1914.

formation is present is usually primary in the middle ear; and in children, in whom gland and bone lesions predominate, primary involvement of the mastoid with secondary progress to middle ear is frequent. The emaciation and debility attendant on advanced phthisis, and the recumbent position of the patient, all contribute to the difficulty of free removal of sputum from the Eustachian vicinity and facilitate passage of minute particles into the Eustachian canal. Ostmann believes that the loss of fat around the lumen of the Eustachian tube causes such an increase of its diameter that transmission of infection is rendered easy. Virchow considers tuberculous caries of the temporal bone as secondary to tuberculosis elsewhere in the body.

SECOND: Abnormal conditions of the upper respiratory tract, including presence of nasopharyngeal adenoid growths, which have been shown by microscopic examination and inoculation tests to be the frequent seat of a latent tuberculosis.

Of adenoids removed from otherwise healthy children the following were found showing evidence of latent tuberculosis: Dielafoy, 20 per cent. of thirty-five cases; Gottstein, 12 per cent. of eight cases; Milligan, sixteen per cent. of his cases. Inoculation tests gave the highest percentage of infection.

Nasal obstructions which interfere with the drainage and ventilation of the nasal fossae and nasopharynx indirectly offer a predisposition.

THIRD: Infancy and childhood offer a predisposition for several reasons: Anatomic conditions and relations favor Eustachian infection. The exanthemata and other infectious diseases are oftenest encountered in childhood. The frequency of adenoids and acute or chronic inflammation of other lymphoid structures in the throat, and the greater susceptibility and relatively less resistance of childhood to infection, are all conditions favorable to infection should the opportunity occur. The embryonal character of the mucosa of the infant's Eustachian tube and tympanum has been advanced as a cause for the easy establishment of a tuberculous lesion in the middle ear. The temporal bone of

the child is soft and contains red marrow, which is not the case in the adult bone.

The pathologic changes in the middle ear and temporal bone are directly excited by the presence of tubercle bacilli, which may be conveyed to the middle ear or its adnexa through the following channels:

1. Mechanically, through the Eustachian tube; either air-borne or introduced into the tympanic cavity by aid of particles of mucus or foreign matter during acts of swallowing, coughing, sneezing or blowing the nose.
2. Infection along the Eustachian tube by other than mechanical means.
3. Through the blood channels.
4. Through the lymphatics.
5. By way of the external auditory canal.
6. By extension of an intracranial infection through the internal auditory canal, Fallopian canal or the labyrinth. This is mentioned merely as a possibility.

Mechanical conveyance of bacilli to the middle ear is not so improbable as superficial consideration might indicate. A review of certain facts in the anatomy of the tubae auditivae leads to an appreciation of the facility of this mode of invasion. In adults the Eustachian tubes are from 33 to 36 mm. in length, and converge downward, making an angle of from 30 to 40 degrees with the horizontal plane. The downward inclination occurs only in the cartilaginous portion of the tube. The height of the lumen of the tube at its pharyngeal orifice is 9 mm., its width 5 mm., while at the tympanic end corresponding measurements are 5 and 3 mm. In infants the tube is much shorter, being less than 20 mm., and its lumen comparatively, and, as stated by Eitelberg, actually, greater in children than in adults. In children, too, the tympanic orifice is larger and on a lower level, and the pharyngeal opening much nearer to the choanae and more in line with the respiratory air currents than in the adult. The ciliated lining of the Eustachian tube tends to remove any extraneous material deposited on it, but a forcible blast of air in a contrary direction may easily transfer the particle to the tympanic cavity. Milligan has suggested that move-

ments of sucking, initiating to and fro currents of air along the Eustachian tubes, favor transmission of infection. He also suggests the possibility of infection from regurgitated curds of tuberculous milk depositing bacilli in the pharynx, tonsil crypts and Eustachian orifices. The mechanical mode of infection appears probable in late phthisis, when the emaciation of the tissues causes the tubes to approach the infantile type, becoming wider in lumen.

Infection through blood channels from a focus more or less distant may localize itself primarily in cancellous spaces of the temporal bone, and invade the middle ear by extension of the process of infiltration and disintegration. Or infection may come from a pre-existent, perhaps quiescent lesion in bone or gland, or from ingested bacilli introduced into the circulation through the thoracic duct. Many observers regard the hematogenous the most frequent mode of infection in childhood.

Clinically, two rather distinct forms of middle-ear tuberculosis manifest themselves; the acute and the chronic. In each may be found all the changes from slight infiltration of the mucous membrane to extensive necrosis of the temporal bone. Rapid loss of tissue is characteristic of the acute form, resulting from ulceration of the tubercles throughout the mucosa. Habermann, Winkler and Brieger think that tuberculosis begins in the mucous membrane of the tympanum, especially on the promontory; Kaesta, in the antrum, while Bernstein holds that the membrana tympani is the site of the first lesion. In the membrana tympani the tubercles are first confined to the intima, and may be seen through the transparent membrane after undergoing caseation. The membrana propria, being more resistant to invasion, is not attacked until the intima is mostly destroyed. Its destruction is said to be due to a process of erosion rather than that of tubercle formation and caseation.

In the chronic form, the process runs an asthenic course and infiltration, caseation and necrosis follow less rapidly and with more characteristic tuberculous sequence. Granulations are flabby, pale and anemic as compared with the vascular, reddish granulations of

pyogenic infection. They may fill the cavity and protrude through a perforated membrane, or the external auditory canal may be occluded by them. The mastoid cells may be replaced with a mass of such granulation in which Milligan found giant-cell formation, caseation and other characteristic tuberculous changes. In the chronic form, circumscribed miliary tubercles develop on the superficial membrane of the tympanum and undergo caseation and ulceration, with giant cell formation.

In determining whether an otitis is tuberculous or not, we must first consider whether the patient shows symptoms in general of tuberculous disease; loss of weight and pyrexia being the most characteristic. In a primary tuberculous otitis, emaciation would not be expected early, not until dissemination supervenes; but in secondary involvement the system is already toxic, and tissue waste in the majority of cases is considerable. Diarrhea often complicates the case and adds its quota to the wasting disease. Extreme dryness of the skin and an occasional rash may also occur.

In the acute form a view of the membrana tympani shows, at first, little to differentiate the condition from a myringitis of non-tuberculous etiology. There are, however, usually two points characteristic. Seldom is the hyperemia uniform over the membrane, nor is it confined along the manubrium and Schrapnell's membrane, as is often observed in the other otites, but, on the contrary, there exist clearly circumscribed areas of palleness and opaqueness, whose location is at variance from what would be expected from the anatomic distribution of the blood-vessels. This pale area is most often found in the lower part of the membrane, including the tip and lower third of the manubrium, and extends near but not quite to the periphery. Accordingly, a second small area (and at times the only area) is immediately posterior to the short process. These areas remain pale, become thicker, as does the membrane throughout, and are invariably the points of first perforation, the destructive process being limited at first closely to the margins of what constituted the pale area.

There is nothing characteristic of the discharge, save

the presence of the tubercle bacilli, occasionally found; and some observers believe that their presence does not in itself absolutely prove the existence of the disease. At first watery and inoffensive, occasionally blood stained, the discharge soon becomes thick or thin, copious or scant and offensive, according to the progress of the disease, whether a pyogenic infection intervenes, and whether a cario-necrotic process is present. Spicules of bone sequestra and ossicles may be found in the discharge.

Granulations may appear at the point of perforation in chronic cases, and remain there, flabby and pale, blocking the exit of the discharge. They may even fill the tympanum or protrude through a large perforation partly or completely filling the external auditory canal. Microscopic examination of these granulations may reveal tubercle, giant and epitheloid cells, caseation and tubercle bacilli.

The absence of pain, the loss of hearing, sometimes complete, and the rapid invasion of the disease, are pathognomonic of otitic tuberculosis. It is stated that sarcoma of the ear is also painless.

Facial paralysis, especially in children, occurs in one-third of the cases, against from 1 to 2 per cent. in non-tubulous conditions. It is of special diagnostic significance.

The only possible means of diagnosis are:

1. Finding microscopically in the discharge or granulation the tubercle bacillus.
2. Giant and epitheloid cells and caseation in the tissue.
3. By experimental inoculation reproducing tuberculosis.

The *Bacillus tuberculosis* can be found in about 50 per cent. of the cases. It is difficult to find after pyogenic bacteria gain access and increased putrefactive changes have occurred. Gruber, Politzer and Bernstein do not consider presence of tubercle bacilli in aural discharge as absolute proof of tuberculous infection, while Gottstein, Koenig and Marschand think that failure to find tubercle bacilli is of little diagnostic importance. Siebenmann and Milligan use inoculation tests in diag-

nosis, while Brieger considers microscopic examination of tissues reliable. We should not forget that non-tuberculous infection may and often does occur in subjects suffering from pulmonary or other tuberculous lesions. Every suspected case should be examined, however, in order that, in primary cases especially, an early diagnosis may be made, and appropriate treatment hygienic, therapeutic or surgical, be instituted.

MASTOID INVOLVEMENT.

Indications for Simple Mastoid Operation. A. D. McCannell⁹ gives the following as conditions which call for performance of the simple mastoid operation:

1. Long-standing acute middle-ear suppurations which resist local rational treatment; or acute middle-ear suppurations in which symptoms of pus-retention and toxic absorption supervene.
2. Cases of acute mastoid infection characterized by pain, which becomes intensified on pressure over the antrum, the tip, the mastoid emissary vein, or the posterior osseous meatal wall; by fever which is persistent, especially in children, after paracentesis; and by a sinking of the posterior-superior meatal wall, or a narrowing of the lumen of the external auditory canal.
3. Cases of acute middle-ear suppuration with nausea, vomiting, dizziness, or facial paralysis; or with symptoms of intra-labyrinthine or intracranial involvement supervening.
4. Cases of subperiosteal abscess.
5. In cases of acute suppuration, as a prophylactic measure against deafness.

When to Operate.—1. In uncomplicated cases the best results are obtained if the operation is performed just after the hyperemic stage of mastoid inflammation has passed, which is usually from twenty-four to thirty-six hours after the advent of mastoid symptoms, for by this time, Nature has shut off the smaller venous blood-vessels in the mastoid, and thus lessened the probability of invasion of the sinus. Lack of attention to this detail, perhaps, is the reason that sinus thrombosis

(9) *Journal-Lancet*, Feb. 15, 1914.

is so common in the practice of some surgeons and very rare in the practice of other surgeons whose experience is equally extensive.

2. The operation should be done at the first sign of intra-labyrinthine involvement, nausea, dizziness, nystagmus, facial paralysis. The first suspicious symptom of sinus or intracranial complication likewise demands immediate surgical relief.

In infants and very young children, on the one hand, and in the aged, on the other, it is dangerous to postpone operative measures, for in the former the loose cellular structure of the bone permits of the spreading of the infective material, and in the latter, due to the harder osseous walls enclosing a purulent middle ear, the material is more apt to spread to the sinus, dura, etc., than to the surface. Heine, Ruttin and Newman claim that where an acute middle-ear suppuration in patients of the above ages does not subside in from four to six weeks, it is far better to perform mastoidectomy than to continue palliative measures.

Dr. McCannell also gives the following general symptoms of acute mastoid disease.

The patient suffers from retention of pus and from absorption of toxins; hence, we have at first headache and malaise with more or less rise of temperature, which in adults is rarely above 101 or 102 F. In children, on the other hand, the temperature is usually much higher, often to 103 to 104 F. As the pathologic process develops, the patient presents a pallid, apprehensive countenance. The head is usually slightly tilted toward the opposite side, and held stiff. The neck muscles are perceptibly tense.

Edema of the eyelids on the diseased side is frequently observed. The pulse and respiration, in uncomplicated cases, are usually normal. The advent of or the existence of an ear discharge is to be noted and studied. A copious discharge which suddenly disappears as if arrested, or one which suddenly becomes less in amount and yet shows no abatement of the purulent process, is always to be looked on with apprehension. A discharge which persists for a long time, especially with a fetid odor, in spite of antiseptic local treatment, even in the

absence of other grave symptoms invariably denotes mastoid involvement and indicates an operation.

Generally pain is present in the early stages of all mastoiditis. Mastoid tenderness should, however, be considered an indication for operation only when other significant signs develop with it, or when the pain persists for a considerable time. Mastoid tenderness usually subsides after a few days. If it reappears it indicates that the pathologic process has advanced.

Mastoid involvement is usually demonstrated by the existence of pain, except in the tuberculous or syphilitic types or in cases due to Friedlander's bacillus or encapsulated streptococcus. The pain is generally steady and often intensified, but among the aged and diabetic it is not marked.

Mastoid tenderness appearing at the same time as an acute otitis indicates that we are dealing only with a pneumatic mastoid, and is not serious. It usually disappears with the subsidence of acute otitis. The three typical points of tenderness are over the antrum, the posterior border, and the tip of the mastoid.

It should also be noted that pain can always be demonstrated on pressure exerted just beneath the mastoid tip. This can be demonstrated even in healthy mastoid processes and should not be taken as an indication for surgical intervention.

The membrana tympani is usually found red, swollen and bulging, with a perforation in one of its quadrants. The pus coming away in pulsations denotes pressure under which it is held. The location of the perforation in cases of suppurative otitis media is of importance as we find that when the perforation is high up in Schrapnell's membrane, and especially in the posterior superior quadrant, there is much greater chance for mastoid involvement; in fact, few heal without operation. Marginal perforations in the superior quadrants, especially in acute exacerbations of chronic suppurative otitis media, as usually serious as we have to deal with co-existing pseudocholesteatoma.

The external auditory canal as a rule presents a narrow lumen in children, due to a periostitis of the underlying bone; in the adult a sinking of the posterior

superior quadrant results from similar causes. These signs call for surgical intervention.

Colon Bacillus Infection of Middle Ear. D. S. Dougherty² reports twelve cases of colon bacillus infection of the middle ear. One fatal case is reported as follows:

A woman, aged 26, Bohemian, two months in the United States; married; one child fifteen months ago. Patient entered hospital by ambulance November 1, with the following history: Three weeks previous she had experienced pain in the left external auditory canal, and over the mastoid and temporal regions, but the pain was at no time referable to the middle ear. Two days later, she noticed a discharge from the canal, which continued for three days and then suddenly ceased. On this cessation of the discharge, the pain became intense and the face and scalp swollen.

Physical examination showed the patient to be poorly nourished and anemic. The left side of face and head were edematous; left eye was partially closed. There was a foul, purulent discharge from the left ear; she had pyorrhea with badly decayed teeth; tonsils were enlarged and phlegmonous. Examination of the eyes was negative; pupillary reaction was good; no neuroretinitis; no nystagmus. Inspection of the ear showed the left canal to be reddened and swollen, and evidently the seat of an old furunculosis; tympanic membranes were intact, slightly retracted, pinkish in color.

Temperature was 101.2 F.; pulse 104; leukocyte count, 19,000; polynuclears, 79 per cent.

On the same day, under general anesthesia, with the assistance of Dr. Harold Hays and the house surgeon, Doctor Seudder, a large curvilinear incision was made, extending from the zygomatic region about one inch in front of the auricle, backward and downward behind the ear to the tip of the mastoid, evacuating an enormous amount of foul greenish-yellow pus of fetid odor. The entire scalp was found to be raised from the bone, forming an abscess cavity which extended almost entirely over the temporal, parietal and occipital regions. Directly under the necrosed mass of muscular tissue,

(2) New York Med. Jour., Dec. 12, 1914.

which seemed to have been the first point of infective attack, there was complete dehiscence of bone, beginning at the juncture of the cortex and tegmen antri, and extending upward and forward, exposing an oblong section of the dura over the sphenotemporal lobe. This exposed dura was dark in color and covered with granulations.

A purulent discharge was welling up from the canal, and probing showed necrosis of the bony posterior wall. The antrum was accordingly opened and the mastoid cells were exenterated. The antrum was found filled with a grumous mass of pus and granulation tissue, and pus was found in the tip cells. The bony edges around the exposed portion of the dura were trimmed back until normal dura appeared, and the wound was dressed with iodoform gauze. The question of opening the dura for fear of cerebral abscess, was entertained, but this was considered unwise on account of the virulent external infection. A spinal puncture was made at this time, and the culture of the fluid obtained was later reported negative. Culture of the pus from the abscess and mastoid showed *B. coli* in pure culture.

The patient progressed comfortably from November 2 to 5, the temperature ranging from 99 to 100 F.

November 6: Patient restless. Temperature rose to 102.5 F.; pulse, 104; respiration, 24. Blood and spinal fluid taken for culture, with negative bacteremic results.

November 7: Temperature again rose from 100 to 102.5 F.; pulse, 120; respiration, 26. Wound when dressed showed pus oozing from between skull and dura. Another culture of the pus showed *B. coli* in pure culture.

November 8 and 9: Patient restless at times; temperature, 99 F.; pulse, 74 to 84.

November 11: Patient very restless, uttering sharp distressing cries. No Kernig sign; no Bakiński reflex; no nystagmus; eye grounds normal. She was seen by the visiting neurologist, who diagnosed the case as post-operative hysteria, with no organic lesion, and declared further operative procedure unwarranted.

November 12: Patient died at 8:40 p. m. Autopsy

showed abscess in left temporal and occipital lobes. Bacteriologic report: Colon bacillus present in pure culture.

Possible Primary Extradural Abscess. W. Wilson³ reports this case. The patient was a child, aged 8 years, presenting slight mastoid edema of one side, but no severe constitutional symptoms except slight pyrexia. The child was recovering from a mild attack of whooping-cough. There was some thin watery yellow pus in the external meatus, but on cleansing and packing this did not recur in quantity. No evidence of any perforation of the membrana tympani could be obtained by inspection, by suction, or by the use of hydrogen peroxide after cleansing. The whole external meatus was, however, sodden. No indications of intra-cerebral involvement could be obtained.

OPERATION: The usual mastoid incision was made. There was marked congestion of superficial tissues, but no pus in the antrum or middle ear. The mucosa of the antrum was a little edematous. The lateral sinus was exposed and found to be pulsating. Part of the bridge was removed, but no pus could be obtained from the middle ear. On account of these negative findings, it was decided to open up the posterior fossa. This was done through the posterior antral wall. After removing bone which was apparently healthy, the pus-searcher suddenly perforated what seemed to be the tense wall of an abscess in the posterior fossa. Immediately the operation wound was flooded by the spurting up of about two ounces of thick white pus under pressure. The opening was then sufficiently enlarged to pack the cavity with iodoform gauze, but no attempt was made at any other treatment owing to the copious hemorrhage from the vascular granulations lining the cavity. The mastoid wound was sutured, leaving a space sufficient for the packing of this abscess cavity backwards through its narrow neck. The antrum itself was not packed.

Recovery was rapid, only a small amount of pus being found on the packing gauze, the remainder of the

wound healing up cleanly. Hearing was perfect one month afterward.

Neither before nor after operation was any evidence discovered of perforation of the membrane tympani, nor of pus in the antrum. The only pus ever seen, with the exception of that in the posterior fossa, was in the external meatus before operation, and this never recurred.

During operation, no fluid could be syringed either way through the membrane, nor at any time was there any reaction to hydrogen peroxide in the meatus. The pus present in the meatus on admission was quite different in appearance from that in the posterior fossa. The former was yellowish, then watery; the latter was thick and milky white.

The author submits two possible explanations: (1) Either the perforation in the tympanic membrane was so small or was so situated that it could not be demonstrated by the methods employed; or (2) the whole tract from external meatus and tympanic membrane to the dura mater was simultaneously affected by an acute infection (probably pneumococcal) from the whooping-cough: this spread by the lymphatics around veins to the posterior fossa, and was there cut off from the surface by lymphangitis occurring in the bony channel.

Roentgen-Ray Study of Mastoids. O. A. Lothrop⁴ has made extensive observations on *x*-ray plates of mastoids made at the Massachusetts Charitable Eye and Ear Infirmary. The *x*-ray exposure is made by placing the side of the head to be skiagraphed on the photographic plate with the film side up. Sometimes the auricle is left in its natural position and at other times it is turned forward. The rays are directed through the head from a point posterior to the opposite mastoid so as to avoid superimposing any dense structures of the head. For this reason, the bony external auditory canal is not shown as a distinct oval but more as a mottled area, and other relations are more or less distorted. The more carefully a plate is exposed and developed the more accurate and easy will be the interpretation. A sclerosed or normal cellular mastoid can be made out

(4) Boston Med. and Surg. Jour., March 5, 1914.

in almost the poorest plate, but for interpretation of slight pathologic changes in acute mastoiditis a good plate is an absolute necessity. Plates of both mastoids should be taken in all cases for comparison.

The normal cellular mastoid projection shows the cellular spaces clearly and the thin partitions are clear cut. Anterior to the cellular area is a roughly triangular, dense area which is the petrous portion of the temporal bone. Within this area the bony meatus shows as a less dense and mottled spot. Had the projection been taken in the direction of the auditory canal, the meatus would have been shown as a hole. Anterior to this triangular area is seen the ascending ramus of the jaw and its articulation. The upper border of the triangular area is formed by the zygoma and its projection posteriorly as the linea temporalis. The middle cranial fossa lies above the border. The zygoma in a normal, cellular mastoid is rarely distinguishable from the other cellular spaces. The position of the lateral sinus and sigmoid curve can generally be made out, but is not so distinct as in a sclerosed mastoid. As in the latter, the anterior border is more distinct. In a general way, it passes from the upper, posterior part obliquely downward and forward to the bulb which lies under the middle ear. The tip is always seen as a distinct free border. The tip may be more or less solid or filled with cells so as to leave only a shell-like cortex.

Posterior to the sinus is seen the posterior cranial fossa in which lies the cerebellum. The suture lines of the occipital, parietal, and mastoid bones often can be seen distinctly. In the young, the cellular area is much restricted and the cells are generally smaller than in older individuals. Not infrequently, there is much variation in the size, shape and arrangement of cells in different cases, but there is a striking similarity between the two mastoids of the same individual. If there is a small mastoid on one side, the other will be small. If one mastoid has small diploëtic cells, the other has also, or if one has large pneumatic cells, such are found in the other. The outline of the cellular area is generally similar in both. The auricle must be mentioned here, not because we desire its projection, but because its

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shadow frequently masks or accentuates some border and allowance must be made for it.

The *x*-ray picture of the mastoid in acute conditions varies as the pathologic processes advance. In the majority of cases of acute otitis media the mastoid cells are affected simultaneously, even though the pathologic condition be only a participating congestion. In all severe infections the mastoid cells are probably likewise infected, and pus from the mastoid is added to that from the middle ear. In this congestive stage the natural cellular appearance of the mastoid would be preserved with the exception that there would be a loss of definition between the cell spaces and their partitions. In fact the whole plate of the mastoid region shows less penetration to light than the other side. This is the most difficult stage of mastoid inflammation to interpret. Almost perfect plates are required.

After from six to ten days the picture changes in cases of virulent mastoiditis. There is now seen a distinct blurring of the mastoid structure. The cell partitions are barely made out and there is very little contrast between the cell spaces and their partitions. At the end of this time, actual loss of some cell partitions may be made out. In such a mastoid, the cell spaces would be found filled with pus, the mucous membrane lining swollen and polypoid, and there would be some softening of the bony partitions.

In a completely sclerosed mastoid no cells whatever can be seen. The bone looks smooth and dense. The meatus and middle ear are seen as in normal mastoids as a less dense area. Usually the antrum shows as a mottled area just above and posterior to the meatus. The lateral sinus generally shows very distinctly in this type of mastoid. The more dense the sclerosed bone and the longer it has existed, the more distinctly does the sinus stand out. The anterior border of the sinus is generally more distinct than the posterior. In some cases the latter can hardly be defined from the surrounding bone. The sinus shows so clearly in this type of mastoid because of the fact that the sigmoid groove is very deep in the mastoid bone. This makes it easy for the rays to pass through the small amount of bony

cortex over the path of the sinus, while it is difficult to penetrate the mass of sclerosed bone on the borders. The fact that there is blood in the sinus does not help to make it conspicuous. On the contrary, it would tend to limit the contrast because light can pass less easily through blood. In cases of cellular mastoids, the dense borders are replaced by cells which obstruct the rays very little and this explains the inconspicuousness of the sinus in the normal mastoid.

Symptoms and Conditions Within the Bone. H. B. Blackwell⁵ reports two cases showing the lack of constancy between the mastoid symptoms and the conditions within the bone.

CASE 1. The patient was a woman who had apparently recovered from a mild acute otitis media. The patient was restless and had slight elevation of temperature. An *x-ray* examination was made and showed slight haziness in the mastoid of the affected side but a mastoid operation did not seem to be indicated.

Thirty-one days after the onset of the trouble, and eighteen days after the ear had apparently returned to the normal and three days after the *x-ray* examination was made, the patient suddenly developed symptoms of basilar meningitis and died within twenty-four hours. A few hours after the symptoms of meningitis she was sent to the hospital and a simple mastoid operation was performed, the entire under surface of the temporo-sphenoidal lobe being exposed, as well as a portion of the posterior fossa, internal to the knee of the sinus, and also the sinus itself, and cerebellum posterior to the sinus, was exposed throughout. No pus was found in the mastoid; only some softened bone in the region of the antrum, and scattered granulation tissue. A great many of the cells contained air. The mastoid looked as though it had almost resolved. The dura did not present any abnormal appearance, and the brain did not seem to be under any tension. It was not incised at that time.

Eight hours after the operation the dura of the middle and posterior fossae was incised and the brain of

(5) Ann. Otol., Rhinol. and Laryngol., September, 1914.

the middle and posterior fossae was explored with the knife, but without result.

Just prior to the operation the blood examination showed 33,500 leukocytes and 91.6 per cent. polymorphonuclear leukocytes.

The spinal fluid drained from the cord, at the time of operation, was very cloudy and showed 3500 cells to the cubic millimeter. Smears from the fluid showed a large number of mixed germs present—pneumococcus and staphylococcus.

Death ensued sixteen hours after the operation, with a typical end picture of meningitis—*e. g.*, opisthotonus, dilated irregular pupils, strabismus, coma, temperature 106 F., rapid pulse, etc.

CASE 2. On Jan. 20, 1914, R. B., aged 46, was admitted to the New York Eye and Ear Infirmary, for mastoid operation, with the following history:

Eighteen days before admission he was seized with pain in the left ear. After three days of more or less pain the left drum was incised; the ear discharged for a day or two and then the discharge ceased. For the past two weeks the ear had been dry and the patient suffered no pain in his ear and had no definite pain in his head. During this time, however, he was unable to sleep, claiming that his head felt queer, and in consequence, he was nervous. He was quite sure that he had no headache or earache.

Aural examination showed a dry external auditory canal. The drum was intact and almost normal in appearance, with no bulging. The hearing was good and there was no mastoid tenderness.

On January 19, the day before the operation was performed, the blood was examined and found to contain 17,000 leukocytes and 60.8 per cent. polynuclear cells. An *x*-ray examination was made at the same time and the report read as follows: The right, or normal side, seems to be an infantile mastoid, with sinus well formed. The left, or diseased, side is rather large celled, pneumatic in type, and cloudy throughout. The sinus is covered with rather indistinct cells and seems to be forward. It appears to be an operative case from an *x*-ray point of view.

Operation was performed, and the mastoid was found to be filled with pus and granulations. The patient ultimately made a good recovery, and is now cured.

These two cases, Blackwell says, represent the extreme ranges of pathologic change which may take place within the mastoid without giving any definite symptoms of ear disease. The first case shows that only a very slight pathologic change in the mastoid may produce a most severe intracranial complication—*e. g.*, meningitis; and also that it is impossible for the *x*-ray to determine the severe nature of these slight pathologic changes.

The second case illustrates the value of the *x*-ray in recognizing the more marked pathologic conditions within the mastoid, when those conditions give rise to no definite clinical symptoms.

As regards the operative indications in these cases, it does not seem that any definite indications can be laid down. Certain points are shown in these two cases:

First, the history of previous ear disease. The patients seemed to be in a state of mental stimulation—due possibly to the congestion or stimulation of the brain, and their conviction that their heads were at fault, and their persistence in sticking to this idea, although neither of them had any subjective or objective symptoms.

Second, no pain in either the ear or the head, but simply the conviction that the head was at fault.

Third, the slight temperature, as shown in the first case, the malaise, the indefinite character.

Fourth, the importance of eliminating all other causes as etiologic factors in producing the above symptoms.

Fifth, the importance of the *x*-ray in making a diagnosis in these cases. The first case did not have sufficient pathologic changes in the mastoid to reveal the condition in the *x*-ray plate, but in the second case the pathologic condition was quite marked, and the diagnosis was made on the *x*-ray report. When the latter patient was seen in the clinic, it was not thought that an operation would be necessary, but as the *x*-ray plate showed a diseased mastoid, despite the fact that there were no symptoms of mastoiditis, an operation was performed

and the mastoid was found to be filled with pus and diseased bone.

SINUS INVOLVEMENT.

Sigmoid Sinus. E. L. Meierhof⁶ believes that the frequency with which the sigmoid sinus is involved in middle-ear inflammations is greater than was formerly suspected. This advance in our knowledge can be attributed to several factors; the more radical technique in operating on the mastoid and thus laying bare and exposing an unsuspected diseased sinus, and the comprehensive diagnostic aids to which we resort in interpreting the true condition underlying unusual cases of middle-ear inflammation. There is, however, one fact to be borne in mind, and that is that the severity of an acute or chronic purulent inflammation is not the only cause of the possible venous channels.

It is very possible for a mild acute inflammation of a very short duration, when the pain and discharge cease, to be followed in a few days by such serious complications as phlebitis and thrombosis of the sigmoid sinus. During this interval of apparent well-being, the patient and family may have paid no attention to the ear, while the patient may present a train of symptoms not at all referable to the ear but to some intercurrent acute affection, say of the abdomen or of the knee with their usual clinical pictures.

If medical advice be then sought, the patient may be found to have a temperature of 104 or 105 F., perhaps preceded by a chill. The slight ear disturbance of the previous week may have been forgotten. There may be at this time no subjective symptom referable to the ear. A physical examination is made, and possibly a tentative diagnosis of typhoid fever may suggest itself in the case of an adult, or, if the patient be a young child, a central pneumonia or influenza. If the patient enters a hospital he may be considered a medical case, nothing of an otologic nature being suspected.

At the hospital a general examination is made, and nothing is revealed, whereupon an examination of the eye-ground and of the ears is resorted to.

Cavernous Sinus Thrombosis. A. Braun⁷ reports a fatal case of cavernous sinus thrombosis, complicating suppurative labyrinthitis.

E. C., a boy of 7, was admitted to Dr. Berens' service, at the Manhattan Eye, Ear and Throat Hospital, on April 17, 1913, with a history of discharge from the right ear for the past five years. Three weeks before, the mother noticed that the child could not close his right eye and that his mouth was crooked. The day before admission, the right eye was closed from swelling of the lids.

On admission the child looked very ill. He was apathetic. His lips and teeth were covered with sordes. His temperature was 100 F., and his pulse 100. In the afternoon the temperature rose to 103 F., pulse to 134, respiration to 20.

The blood count showed leukocytosis of 36,400; large mononuclears, 7 per cent.; small mononuclears, 4 per cent.; polynuclear neutrophiles, 87 per cent.; transitional forms, 2 per cent. Blood culture was negative.

The right external auditory canal was filled by an aural polyp. There was a profuse, foul-smelling discharge. There was complete deafness in the right ear, and a negative caloric reaction. The left ear was normal. There was no spontaneous nystagmus.

The right side of the face was paretic, and there was paresis of the right third nerve, resulting in ptosis and divergent strabismus. The eye could move in no direction except outward. There was slight dilatation of the pupil and some edema of the eyelids.

A diagnosis of chronic diffuse suppurative labyrinthitis with thrombosis of the cavernous sinus was made.

A radical mastoid operation was done. Cholesteatoma and granulations were found in the antrum and middle ear. The facial nerve was found exposed and imbedded in granulations, for a distance of three-eighths of an inch, between the external semicircular canal and the oval window. There was a necrotic area over the external semicircular canal. All three semicircular canals were found full of granulations. They were

(7) Ann. Otol., Rhinol. and Laryngol., June, 1914.

removed and the vestibule opened. This was also found to be full of granulations. The stapes was removed. It came out very easily. The promontory was removed, and the first and second turns of the cochlea were found full of granulations. The lateral sinus and the dura of the middle fossa were exposed and found normal. The patient was put back to bed.

On the next day, April 18, the temperature rose to 105.4 F., at which point it remained until death. The pulse ranged between 100 and 160 and the respiration between 20 and 40.

The edema of the lids increased, exophthalmos appeared, and the conjunctiva became chemotic. The dilatation of the pupil increased.

On April 19 there appeared slight edema of the lid of the left eye. The eye-grounds were normal.

On April 20 death occurred at two o'clock in the afternoon.

Postmortem: Pus and granulations were found in the right internal auditory meatus. From this point a necrotic tract could be seen leading to the inferior petrosal sinus. This sinus contained a broken-down thrombus, which continued forward into the right cavernous sinus. The clot extended across to the left cavernous sinus through the circular sinus to the left cavernous sinus. In the upper wall of the left cavernous sinus there was a small perforation, about $\frac{1}{8}$ inch in diameter. The pia over the tip of the left temporo-sphenoidal lobe, which was in contact with this perforation, was covered with exudate. This patch of exudate was sharply circumscribed in outline. It was $1\frac{1}{2}$ inches long, and $\frac{1}{2}$ inch wide. On microscopic examination it was seen that this exudate was in the meshes of the pia, and not on its surface, and running through the middle of this patch was a thrombosed pial vein. The pituitary body was necrotic.

I. Friesner⁸ reports a case of simultaneous bilateral cavernous sinus thrombosis, beginning twelve hours after a simple mastoid operation.

When the patient, a woman, was examined there was neither redness nor edema over the mastoid. The drum

was red but not bulging, and the canal walls were normal. There was a profuse, thin, purulent discharge, which was without odor. The mastoid was exquisitely tender over the tip, but less so over the antrum and emissary vein.

Operation was advised and consented to, and on Sunday afternoon a simple mastoidectomy was done. The mastoid process was of the pneumatic type. The cells were full of pus and granulations (probably swollen mucosa), but there was no bone disintegration. The septa between the cells were firm, and considerable force was necessary to break them down with a curette. At the operation the cells were completely exenterated, but neither dura nor sinus was exposed. The inner table over both was apparently normal. On admission to the hospital the patient's temperature was 102 F. It remained at about this point until the following morning. Then it began a gradual but steady rise during the entire day, until, at 11 p. m., it had reached 105.8 F.

Early on the morning following the operation the nurse informed Friesner that during the night the patient had complained of pain in both eyes, and that the eyes had become swollen. When he saw her she complained of intense pain in both eyes, and the eyes showed considerable edema of the lids and conjunctivae. The bulbar conjunctivae struck him, particularly, as peculiar, in that there was much chemosis, and the mucous membrane had taken on a translucent, almost transparent appearance, and looked like a clear soap. During the night she had complained of slight headache, but the severe pain, which she experienced immediately before her operation, had disappeared and did not return.

The edema of the eyes and lids increased during the next two days and there was some exophthalmos, but all the signs were from the very beginning more marked on the left side, the operated ear being the right one. At noon on the day following the operation the patient vomited for the first time, and during the succeeding thirty-six hours she vomited at frequent intervals. Then the vomiting ceased and did not recur. On the day following the operation a blood count was made. Total leukocytes, 6400; polymorphonuclears, 80 per cent.;

transitionals, 6 per cent.; eosinophiles, none. The blood was very watery. Blood culture was negative. Two days later the blood count showed total leukocytes, 13,400; polymorphonuclears, 85 per cent. Blood culture negative.

From the height of 105.8 F., to which the temperature rose the day after the operation, it dropped during the next twelve hours to 102 F. At noon of the second day the patient had a severe chill, lasting eight minutes, and within four hours the temperature had risen to 106 F. and had dropped back again to 102 F., without a sweat. From this time on the temperature ran a typically septic course, with chills, but without sweats. The pulse became progressively more rapid and feeble.

There was but one septic metastasis. It occurred at the metacarpophalangeal joint of the little finger, on the left hand, and appeared on the fourth day after the operation. The orbital edema continued unchanged until forty-eight hours before death. Then, within a few hours, the swelling of the right eye disappeared entirely, while that of the left became very much less.

Heart, lungs and urine were repeatedly examined. Nothing abnormal was found. The woman had an atrophic rhinitis, probably due to chronic sinus disease, and had been advised to undergo some nasal operation, in Vienna, a year before.

[The cavernous sinus involvement may have been and probably was due to nasal disease.—ED.]

BRAIN INVOLVEMENT.

Symptoms of Intracranial Complications. J. C. Beck⁹ gives the following as indications of intracranial complications of ear diseases.

MENINGITIS: (a) Serous meningitis.—One of the first signs is the increasing headache, at first localized, usually near the seat of the perforation or path of infection, and soon becoming diffuse over the head. The patient loses his appetite, his tongue becomes coated, the emunctaries become sluggish in their action, and nausea is a very common symptom. The temperature rises, and

if the septic is going to follow, this rise is often quite rapid, so that there may occur small chills from the infection of the cerebrospinal fluid. The pulse and respiration rate is now considerably increased. The patient is very irritable and restless, and does not sleep. As soon as the fluid increases within the cavity there is observed the characteristic syndrome of rolling the eyes, especially upward, the neck is drawn backward, and finally the leg on the thigh and thigh on the abdomen. Attempts to straighten them out are resisted and appear to be painful—Kernig's sign.

Stroking the bottom of the feet with some semisharp instrument or the finger-nail will cause the big toe to turn up instead of down—Babinski's sign.

Taking the head and tilting it forward against the chest will cause the limbs to be drawn up—Brudzinski's sign.

All the other symptoms as pressing over the peroneal nerve and muscle (Gordon's sign), which will cause the extension of the toes, the stroking of the anterior tibial surface (Oppenheim's sign), or the stroking of the region of the external malleolus (Chaddock's sign), will produce retraction of the toes. All these signs, Beck says, prove that the upper neuron (within the cranium) is involved. The patient now will lapse into unconsciousness, and be roused with more or less difficulty again to relapse in the same condition. The pupils become sluggish in their action, at first becoming small, then irregular, and finally dilated.

Ophthalmoscopic examination may reveal choked disk. Spinal puncture shows increased pressure by fluid very frequently coming through the hollow needle with a spurt, and clear or slightly cloudy. Following such a puncture the patient is very often much improved for from a half an hour to a whole day, but the symptoms soon return.

A complete examination of the cerebrospinal fluid thus removed, will aid a great deal in diagnosis. This includes the following:

1. Remove about 25 c.c. at spinal puncture.
2. Make several slides and stains for organisms, as septic and tuberculous.

3. Examine and count the endothelial cells, leukocytes, and pus cells.
4. Make cultures.
5. Make a Noguchi (butyric-acid) test for excess of albumin.
6. Make a Lange colloidal test.
7. Make Wassermann, Nonne, and Noguchi tests for syphilis.
8. Test for sugar.
9. Test for total acidity and relative acidity.
10. Cholin may be tested for.

In the serous form one will find cells increased somewhat, especially the leukocytes, but the microorganisms are conspicuous by their absence.

The Lange (colloidal-gold-chloride) test will show the characteristic color reaction of a septic process. The Noguchi (butyric-acid) test will be positive—excess of albumin. The Wassermann, Nonne, and Noguchi tests for syphilis are negative (unless such a case should be a complicated one). The test for sugar is very important in that in serous meningitis sugar is present. The relative acidity is not markedly affected, and cholin is not present, or, if so, in only small quantity.

(b) Septic meningitis.—If this is localized, and there is a collateral serous meningitis associated with it, then the symptoms may be the same as just described; however, the cerebrospinal fluid will show a greater degree of irritation, and the fluid may contain some micro-organisms. The majority of localized septic meningitis cases, however, are not so severe in their course as the serous or diffuse septic forms. The one important symptom is the localized headache, which is quite persistent, and the greater rise in the temperature. There are, undoubtedly, many cases of localized meningitis that show a perfectly normal cerebrospinal fluid, and in which most of the cardinal symptoms will be absent; and these are the cases that usually end in recovery or lead to extradural abscesses subsequently.

The diffuse septic meningitis is the most discouraging intracranial complication that we have to deal with, and the diagnosis as a rule is not difficult. It usually is preceded by the serous form, but within a very short time

the graver symptoms of sepsis develop. The most positive symptom is the spinal puncture. The fluid comes out under pressure, but not so great as in the serous form, and is turbid. The turbidity varies in degree with the amount of infection. It has the appearance at times of pure pus; in fact, that is what it is. Bacteriologically one will find many microorganisms of the character of the infection; and leukocytes or pus cells are very numerous.

The sugar reaction is always absent, and the acidity is much increased as is the quantity of cholin.

The pressure of irritation as the Kernig and Babinski tests, as well as the pupillary reactions, are practically the same as in the serous meningitis, only that they soon give way to the paralytic form, namely: pupils dilate, the patient is in a constant stupor or coma, and the involuntary urination and bowel movements become very manifest. The patient is, as a rule, unable to take or to be given nourishment. The outcome is, in Beck's experience, with one exception, always fatal due to diffuse cerebritis.

BRAIN ABSCESS.—This is most frequently associated with chronic suppuration of the middle ear and mastoid, and labyrinthine disease. As stated before, we must consider two principal types, namely, those outside the dura and those within.

They may exist at the same time, or the intradural abscess may frequently follow the extradural abscess, especially in acute exacerbations. The paramount symptom is the great pain in the head, most frequently localized at or in close proximity to the abscess. Beck has, however, seen several instances in which the patient located the pain in the anterior portion of the head and operation or post-mortem examination disclosed it in the posterior cerebral fossa. This pain is not at all unlike that in brain tumor, and there are exacerbations in the headaches sometimes at night, at other times in the mornings, and in one of his cases the patient would have about ten attacks of severe head-pains within twenty-four hours, and in the intervals be fairly comfortable.

The next group of symptoms of importance are the focal lesions, which will correspond to the anatomico-

physiologic locations and actions. These focal symptoms will vary in degree in that they be either irritative or descrutive. For instance, a small abscess pressing over the motor area will cause clonic contraction; and a still larger abscess, especially if it be intradural, will produce paralysis of that portion of the body governed by that particular area. Again, if the abscess be located in the cerebellar region it will cause a train of symptoms of imbalance and loss of interpretation of direction, which must be carefully differentiated from the irritation of the labyrinth. One of the most important late contributions in this regard is the "pointing test" of Barany in connection with cerebellar lesions; and careful study and experimenting at every opportunity is very much recommended, in order to familiarize one's self with this test. This in connection with the various labyrinth tests makes the differential diagnosis much more easy. One must remember that both labyrinthian irritation in connection with suppuration of the ear and cerebellar irritation from brain asbcess may exist at the same time.

Intracranial pressure, being increased in brain abscess, will cause the cerebrospinal fluid to be increased and found to be so by spinal puncture, although no pus cells or microörganisms will be found, unless there is also a concomitant diffuse septic meningitis or ventricular infection present. The ocular symptoms of intracranial pressure, such as pupillary (often one large and one small) and choked disk, are usually present. The pulse rate and respiration will be affected, as in brain tumor, according to the size of the abscess. The larger the abscess the slower the pulse and respiration. The temperature, as well as the pulse and respiration, will vary as to whether the abscess be intradural or extradural. Intradural abscesses will frequently cause considerable rise of temperature, and acceleration of the pulse and respiration, and a remission when the abscess has become partially walled off. As soon as a fresh invasion of brain tissue takes place another rise of temperature, etc., occurs.

Projectile vomiting is, as in brain tumor, quite frequently encountered.

Otitic Brain Abscess. Archer Rylands¹ reports a fatal case of brain abscess of otitic origin which on exposing the dura did not show the characteristic symptoms of brain pressure.

The necropsy revealed an abscess cavity in the right temporosphenoidal lobe. It did not extend to the ventricle, which was found to be normal. There was no evidence of meningitis. There was slight discoloration of the dura overlying the tegmen tympani. There was no obvious disease of bone in the region of the tegmen attic. The pyogenic membrane was soft, but yet presented as a well-defined thickened zone or capsule. There was no other focus of suppuration in the brain.

The case presents several points of interest, namely:

1. With regard to the probable duration of the abscess, the thickness of the pyogenic membrane and the large size of the abscess itself are signs that seem to indicate a period of weeks rather than of days.

2. The cerebrospinal fluid was on all occasions sterile, both as regards direct and cultural examination. The very marked turbidity of the first specimen formed a most striking contrast to the appearances on a second and third puncture.

3. The significance of these variations with regard to the pathologic content and to the tension of the fluid is perhaps not obvious. It seems, however, clear that turbidity of the cerebrospinal fluid, even though that turbidity should apparently clear up within a short interval, appearing in the course of chronic suppurative otitis media, and associated with cerebral symptoms, is a combination affording cogent evidence in favor of intracranial sepsis.

4. The absence of dural bulging and of increased dural tension in the region of the tegmen tympani may perhaps be explained by the fact that only a small area of the membrane was here exposed. It can only be said that the dura mater underlying the trephine opening was within the distance of one inch from the tympanic roof, and that here the tension was greatly increased.

5. Doubt remains as to the exact route of infection; if infection was established in the accepted way—by

(1) Brit. Med. Jour., April 4, 1914.

means of an infective stalk passing through the tympanic roof, through the dura, and then along the course of the vessels of the pia mater to their free bifurcation beyond the deep surface of the grey matter—the facts at least show how small may be the changes in these intermediate tissues for sphenoidal lobe abscess.

Sarcoma of Dura Simulating Mastoiditis. J. T. Barnhill³ reports two cases of sarcoma of the dura mater simulating mastoiditis. One of the cases was in a woman aged 36, who complained of a pain in the right ear and the right side of the face. She stated that she had suffered some pain in the region of the ear for ten years and that two years ago the pain was intense in the ear for a short time, that there was then a slight aural discharge which soon ceased, after which the pain was relieved, but that there was still a feeling of soreness and occasional sharp pain deeply situated in the ear, but not behind the ear or over the face, gradually increased and was always worse at night, preventing sleep during the morning hours. The character of the suffering frequently seemed neuralgic, starting in the face and radiating toward and into the ear. She could recall no injury to the face, ear or mastoid region. She had never suffered from dizziness, nausea or general headache.

On objective examination, it was observed that the patient was anemic, and looked worn and debilitated from the long-continued suffering. Strabismus of the right eye was present, due, it was stated, to a convulsion which took place two years previously. There was no pupillary disturbance. There was slight tenderness over the right side of the face and on deep pressure over the mastoid. Hearing was almost absent in the right ear, having been lost, according to the patient, about ten years before. Bone conduction was absent. The appearance of the drum membrane was almost normal.

Barnhill next saw the patient, Aug. 6, 1912, at which time there was nothing new worthy of record other than the continued evidence of persistent acute suffering. He was unable after this second examination to determine with any degree of certainty the cause of her trouble, and so stated. It seemed possible that a latent and

(3) Ann. Otol., Rhinol. and Laryngol., June, 1914.

anomalous mastoiditis was present, but such a diagnosis could be based only on experience with other somewhat similar cases of mastoid anomaly, and not on facts gained from the present examination. The patient had, however, fully resolved to have any operation performed that promised relief, and was even willing to undergo exploratory operative measures.

An exploratory mastoid operation was performed. More extensive incisions than usual were made, and the bone of the mastoid region was widely exposed by reflecting the tissue flaps thus outlined. The bone looked softened and at one point, about an inch posterior to the external meatus, granulation buds were beginning to protrude through to the outer surface. On chiseling away the surrounding osseous structure a large granulating mass was encountered which occupied the entire cellular environment backward, inward and upward. When well uncovered, the attachment of this mass was found to be on the dura, over and posterior to the sigmoid sinus, and over the posterior lower portion of the temporosphenoidal lobe. In removing it rather severe hemorrhage resulted, not from the tumor itself, but chiefly from the sigmoid sinus, the wall of which was perforated in the process of separation.

As a result of the operation the patient was greatly but not entirely relieved from the former pain, the wound healed rapidly and closed completely within a month, enabling the patient to return to her home, some considerable distance. Within a few weeks the pain began to increase in severity, strength and mentality gradually failed, and death occurred March 1, 1913, as a result of some "brain trouble." Laboratory examination of the specimen removed showed it to be an endothelial sarcoma.

Intracranial Complications of Ear Disease. A. A. Bardes⁴ in discussing intracranial diseases due to ear disease says that the popular belief that it is perilous to check a running ear is based on the knowledge that the sudden cessation of an active discharge is often attended by dire results. It is the practice of some physicians to fill the ear with boric acid or tannic acid.

The objection to the method is that the moisture is apt to convert the powder into a hard lump, which may dam back the pus with alarming results. Exuberant granulations or adhesions in the middle ear, or too small an opening in the drum head also may aid in the suppression of the discharge. In the case of cholesteatomatous formation, the sodden epidermis is the obstruction. A small perforation in the upper part of the drum head is always to be feared. Its position is indicative of attic necrosis and the attic is close to the brain.

Ear disease may be the cause of death in three ways: from brain abscess; from sinus thrombosis, and from meningitis. In many instances, meningitis co-exists with brain abscess and with sinus thrombosis. Sometimes all three conditions are present. Meningitis is much more dangerous than either of the other conditions.

Infection may reach the interior of the skull in various ways. It may travel by direct continuity or by bone destruction. It may follow preformed channels in the bone, such as afford passage for vessels and nerves. It may follow the windings of the labyrinth or be conveyed by the lymphatic or vascular channels that freely intermingle with the structures beneath.

In most long-continued mastoid suppurations, the cancellous bone has been absorbed and has been replaced with deposits of lime salt, which give to the bone the hardness of ivory. Occasionally the suppuration destroys all the bone, leaving a cavity within the mastoid process. This is a common occurrence in children and is thought to be due to the presence of the tubercle bacillus. It can be readily understood that when the mastoid cortex is made up of dense bone, the suppression of a suppurative process will force it to take another route, at the point of least resistance. This may lead within the skull. The two most vulnerable parts of the skull are at the tympanic roof and at the base of the squama. The thin plate of bone that separates the middle ear from the temporosphenoidal lobe of the brain is easily eroded by an active septic infection. In young children the roof of the middle ear is separated from the brain by nothing more than a fibrous membrane. The other vulnerable point, the base of the squama, is the place

where the erosion usually occurs that leads to sinus thrombosis and to cerebellar abscess.

A brain abscess may occur at any age. It is most commonly encountered between the ages of 10 and 30 years, more rarely between 30 and 60. There is usually but one abscess. It is encapsulated and varies in size from that of a filbert to that of a lemon. Multiple abscesses, when they occur, are smaller. Although the abscess capsule offers but scant resistance to direct pressure, it prevents the spread of the infection. A brain abscess is capable of undergoing resolution in the same way as a tuberculosis deposit in the lungs. Autopsies sometimes reveal a brain abscess which has existed for years without giving trouble. A brain abscess may cause death in a number of ways; by infecting the meninges, by invading the ventricles, or by pressing on and paralyzing one of the vital centers of the brain.

A pus collection within the skull is generally found near the site of infection. Thus a cerebral abscess is usually found near the roof of the middle ear. A cerebellar abscess is a rare occurrence. It may come from the labyrinth or from near the base of the squama.

A constant and distressing symptom of all intracranial involvements is nocturnal headache. It is more severe than the headache of mastoiditis. It is so tormenting that many patients grasp the head even when they are unconscious. When the dull pain of mastoiditis suddenly changes to a violent one-sided headache, the chances are that the disease has entered the cranium. The headache is the result of the accumulating cerebrospinal fluid, which is increased in all cerebral disturbances. Rapid emaciation from disturbed metabolism is another early and constant symptom of these troubles. Mental irritability and a decided change in disposition are usually observed. Nausea and vomiting may accompany any form of intracranial disease, from disturbance of the gastric portion of the vagus. When these symptoms occur late in the disease, they point to cerebral abscess. Attacks of vertigo are common, from labyrinthine irritation. Percussion and pressure over the skull are painful, especially in infants and in the aged. The former are unable to give trustworthy testimony as

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to pain, and the latter may not feel the pain owing to the density of the bone. Intestinal toxemia begins early, from disturbed metabolism. At first constipation is the rule, as in most febrile disorders, but when pyemia sets in, Nature tries to throw off the poison and septic diarrhea follows.

At this time lumbar puncture may be useful as a means of diagnosis. Normal cerebrospinal fluid is clear and sterile and has a specific gravity of 1001. It has a pressure of six mm. Hg. and 100 mm. of water. It contains just a trace of albumin. If the fluid deviates from any of these requirements, it is pathologic and is indicative of meningitis. Every diseased state of the meninges is accompanied by an augmented amount of cerebrospinal fluid, the increased pressure of which disturbs the functions of the vasomotor, the respiratory, and the cardiac centres in the brain. The withdrawal of cerebrospinal fluid for the relief of pressure symptoms is of no lasting benefit. Twenty minutes later the fluid is replenished.

Meningitis from aural disease occurs oftener than is suspected. What is often thought to be epidemic cerebrospinal meningitis and tuberculous meningitis in children is, in reality, suppurative meningitis from the ear. Fully 50 per cent. of patients with labyrinthine suppuration succumb to meningitis. As soon as the meninges become infected, the disease travels rapidly, invading the arachnoid membrane until the whole of this delicate structure is involved, including its ramifications in the spinal canal.

The moment meningitis is added to intracranial disease, the case assumes a hopeless aspect. A new set of symptoms appears. Headache is no longer localized, but becomes general and more severe. There are signs of mental excitation, such as restlessness, photophobia, head noises, delirium, and insomnia. There are frequent attacks of retching and vomiting not dependent on the taking of food. There is rigidity of the neck and limbs. This stiffness belongs to the same class of symptoms as trismus, grinding of the teeth, and spastic contraction of the abdominal muscles, which gives the sunken abdomen. The surface of the body is flushed and hyper-

sensitive. Optical disturbances are the rule, such as optic neuritis, nystagmus, and squint. The temperature is high, but not excessively so. The pulse is small and rapid, the respirations are shallow and fast. Exhaustion soon sets in and the patient collapses and becomes dull and stupid. Convulsions are apt to follow, at first, regional, then general. Paralysis of one of the vital centers finally closes the scene.

The points on which a diagnosis of brain abscess is made, are vague and uncertain. The localization of the abscess is still more difficult. In the beginning, the temperature is high. It soon declines to normal or lower, and remains low. The pulse is rapid at first, then as the intracranial pressure is raised, it becomes slow and full—the cerebral pulse. As the patient loses strength, the pulse becomes weak and irregular. The respiration is in keeping with the pulse. Ocular disorders are usually present in the form of optic neuritis and nystagmus. Vomiting is severe and persistent, particularly in the later stage.

The cerebral pressure causes drowsiness and dull cerebration. Answers to questions come slowly and in monosyllables. There is apt to be a confusion of ideas. The mental deterioration gradually passes into coma. Convulsive movements are frequently observed; often they precede an attack of regional paralysis. When the internal capsule is invaded, hemiplegia usually terminates the picture. The symptoms of cerebellar abscess are more obscure even than those of temperosphenoidal abscess. They are similar to those of brain abscess. The pain, however, is greatest in the occiput and dizziness and vomiting are pronounced features.

INTERNAL EAR.

Pseudo-Ménière's Disease. D. H. Walker⁵ reports a case and discusses a form of aural vertigo sometimes called pseudo-Ménière's disease.

Aural vertigo is a symptom common to a number of affections such as the more or less transitory vertigo, due to toxemia, to gastric, or to ocular causes. It is an

(5) Boston Med. and Surg. Jour., May 21, 1914.

affection that occurs most commonly in persons of middle age; persons usually healthy in every other respect, the attacks occurring at almost any time, often with no regard as to whether the patient is active or at rest.

That the labyrinth is a closed cavity is the opinion of all observers. Although there are the aqueductus vestibuli and the aqueductus cochlea, they are not patent for the free passage of fluid, according to the researches of Schwalbe and Schonemann. The aqueductus vestibuli contains the ductus endolymphaticus, which ends in the saccus endolymphaticus, an organ which has long been overlooked, yet is constant in all animals in which hearing is a sense. One can not here enter into a description of the important part it plays in the lower animals, nor its prominence in the development of the human ear.

It is generally admitted that true apoplectic vertigo is caused by increased labyrinthine pressure, and this belief is justified by the fact that what relief has been obtained has been through agencies which cause either a lymphatic or a circulatory depletion, such as pilo-carpine, adrenaline, purgatives, lumbar puncture, the use of setons or by the surgical destruction of the labyrinth. Again the theory is strengthened by the results of the removal of the stapes, with a transient relief of the attacks of vertigo, and the recurrence of attacks after the foramen ovale has become closed.

Patients affected with this type of vertigo nearly always have diminished hearing, to a greater or less degree. This is true without respect to age. In the cases which have come to the author's attention, there is little objective evidence of middle-ear change, so that the conclusion drawn is that there is a degree of osseous change, which in the first place would destroy the extrinsic mechanism for the control of labyrinthine pressure, as shown by Blake and Wales. Furthermore is there any reason that the process be limited to that portion of the labyrinthine capsule? Could not that osseous change involve the region of the aqueductus vestibuli, causing a cessation of any function the saccus endolymphaticus may have, acting as an intrinsic organ of equilibrium? Also could not that same change affect the lumen of the aqueductus cochlea and of the aque-

ductus vestibuli, resulting not only in impeded drainage, but possibly in a passive congestion, by retarding the venous flow? If the foregoing suggest a possible hypothesis, it would explain the reason for the gradual increase of pressure, until a maximum is reached where relief is obtained by a sudden decrease in tension, due to the forcing of fluid through the lymph spaces in the aqueductus cochlea or a rupture of some part of the membranous labyrinth. The sudden lowering of the labyrinthine pressure would occasion the apoplectic attack of vertigo.

The fact that true oral vertigo causes such great prostration and is such a great inconvenience to the sufferer makes it essential that we do all that is possible to alleviate the symptoms or cure the affection. In mild cases in which there is a more or less constant feeling of disturbed equilibrium and fear of impending attacks, depletion in the various ways in which it has been practised, as reported in the literature, is recommended. Randall proposed in 1902 the use of small doses of adrenaline, as a capillary depressant, and his results have been very favorable.

Lumbar puncture, as first performed by Babinski, should be tried. There is no doubt but that in certain cases alleviation and even complete relief has been effected by lumbar puncture, with the withdrawal of the fluid and if done fairly soon after an attack, the labyrinthine pressure might be sufficiently reduced to give immunity from future attacks for a long time.

Treatment of Labyrinthitis. Ernst Danziger⁶ differentiates between the treatment of diffuse serous labyrinthitis complicating acute and chronic purulent otitis media.

The lines of indication for operation in diffuse labyrinthitis *chronic otorrhea* are at present clearly drawn and we all realize that a diffuse labyrinthitis followed by complete loss of function carries with it the imminent danger of purulent meningitis or abscess in the posterior fossa. No one will hesitate under such conditions to drain the labyrinth and, if necessary, the subdural spaces.

(6) Ann. Otol., Rhinol. and Laryngol., June, 1912.

It is different in cases of diffuse labyrinthitis complicating *acute* middle ear suppurations.

Three cases are reported by Danziger in which labyrinthitis complicated acute purulent otitis media. Each of the patients recovered without surgical interference with the labyrinth. In his opinion, we have to differentiate between labyrinthitis as a very early complication, within a day or two of the onset of the acute otitis, without temperature or meningeal irritation, and labyrinthitis occurring after some weeks, together with bone complication of the mastoid process, with rise of temperature and head ache. The former are of the serous type, the latter, in a large proportion of cases, of the purulent type. In the former, any operation is contraindicated; in the latter, where there is complete loss of function, the labyrinth operation is decidedly indicated. The report of Danziger's cases includes only cases of diffuse labyrinthitis occurring as an early complication of acute otitis media.

Report of Cases of Labyrinth Disease. W. C. Phillips⁷ reports six cases of inflammatory labyrinthine disease two of which were fatal. One of the fatal cases of suppurative labyrinthitis is as follows:

The patient, a man, went to Dr. Phillips' Clinic at the Manhattan Eye and Ear Hospital April 5, 1913. He gave a history of dizziness for about two weeks. He had had chronic suppuration for a great many years in both ears. Both ears were discharging slightly at examination. Patient did not complain of anything but dizziness.

Tests: Hearing in both ears was tested with noise apparatus. Very little hearing in the right ear. Rotation to right, nystagmus to left for 14 seconds. Rotation to left, nystagmus to right for 9 seconds. Caloric test negative in right ear, not used in left.

Patient was sent to hospital. A few days later he complained of severe headache, and had a temperature of 100 F. Neither mastoids were tender, and the discharge was less in each ear. Tongue was coated and remained so in spite of free catharsis. The severe headache continued for a week, the patient was rational,

memory good, eye-grounds clear, temperature range from 100 to 102 F. Pulse gradually became slower until it was 60, but at times it would go to 88. No retraction of head, dizziness disappeared, headache improved after ten days, but returned. Leukocytosis count negative. Headache, variable, but usually present, localized to the left side. No vomiting. Patient gave a history of syphilis, and had old cutaneous lesions. Wassermann reaction negative.

Examination on April 18 showed very little change. Patient rational and clear. Memory good. No pain on percussion of head. No mastoid tenderness. No dizziness. Nystagmus spontaneous to the left. Hearing for watch apparently present in right ear. Hearing in left. No restlessness. Headache still present. Tongue coated. Temperature 102 F. Had a chill in the morning.

Exploration of the cerebellum the following day. Decided on antisyphilitic treatment; also ordered spinal puncture. Examination of fluid showed it to be loaded with *Streptococcus mucosa*. Chemical tests showed excess of lactic acid, absence of copper-reducing agent.

Patient almost unconscious. Facial paralysis present. Condition very bad. Operation, drainage of cisterna magna. Cerebellum directly under dura. Only small amount of fluid escaped. Patient died same night.

Autopsy: Mastoid filled with pus—purulent labyrinthitis—meningitis—no abscess. Autopsy of head only permitted. Removal of the cranial vault showed the dura very adherent to the bone throughout its extent. The meningeal tissues thickened—evidence of a chronic inflammatory process presented.

The opened meninges revealed a large collection of thin fluid in the meshes of the pia. The largest collection of this fluid was found in the posterior cranial fossa. The membranes at the base of the brain generally were more acutely inflamed than elsewhere.

On removing the brain, a rather distinct collection of whitish pus—in contrast with the other collections of fluid found—was localized at the internal auditory meatus, filling this structure and bathing the facial and the auditory nerves. The removal of the adherent meninges from the bone on the internal side of the petrosa,

disclosed darkly discolored bone involving the tegmen tympani, and tegmen cellulae mastoidea.

On opening the tegmen in these regions, the tympanic cavity was found filled with purulent contents, semifluid in nature. The malleus was recovered and found to present no evidence of necrosis. The incus was not found. The removal of the tegmen cellulae mastoidea revealed the mastoid process filled with dark, discolored, thick, but semifluid mass, some intracellular walls were present, but the probe easily broke down these evidences of an acute infection of the mastoid process.

Opening inward into the cochlea from the internal auditory meatus, this structure likewise was found filled with similar purulent matter, the only anatomic structure intact being the promontory. The superior semicircular canal was likewise discolored. The lateral sinus on the right side contained a red thrombus—probably a post-mortem condition.

Brain: Pial vessels injected. Both lateral ventricles much distended with a water-clear fluid. Incision into two sections of both the cerebrum and the cerebellum failed to reveal any abscesses.

Comments on autopsy findings: The autopsy findings warrant the following conclusions:

1. The patient suffered from an old, chronic, meningeal inflammation. His admission of having had syphilis would explain this finding, in spite of the negative report of the Wassermann test.

2. There was an acute exacerbation or an acute infection of the middle ear and the labyrinth cavities. The intact malleus, with its ligament attachments, speaks against a chronic middle-ear otitis media. The acute infection involved the middle ear, including the mastoid process, and the labyrinth, finally breaking endocranially along the route of the nerves, facial and auditory, to begin the infection of the meninges at the internal auditory meatus.

3. The infection resulted in a general involvement of the basilar meninges, and the accumulation of purulent fluid in the posterior cranial fossa—a posterior basilar meningitis resulting. The distension of the lat-

eral ventricles by water-clear fluid was a secondary manifestation.

4. The facial paralysis noted as presenting itself on April 19, just prior to operation on the meninges, is accounted for by the route traveled by the infection from the internal ear to the meninges.

5. The operation for the drainage of the cisterna magna was not successful in so far that there was present at autopsy a very large collection of pus in the posterior cranial fossa, which was not drained off by the procedure, although this opening did not sufficiently divide the foramen magnum from the internal side.

Aviation Accidents and Disturbance of Vestibular Apparatus. J. A. Babbitt⁸ suggests that some of the aviation accidents may be due to disturbance of the vestibular apparatus. He has investigated the records of over 300 aviation fatalities. This history was searched with but one object in view; to find, if possible, to what extent the loss of equilibration could be held accountable. Inasmuch as these were practically all fatal, etiology traced to post-accidental conditions present, such as a broken propeller, jammed gear, structural collapse, etc., is not sufficient explanation. To the enthusiast, the possibilities of aviation are unlimitable. We can scarcely conceive the meaning of this to us within even the next decade. The query arises: "Cannot this in a measure be related to the field of the otologist?" Aviator's sickness is probably in a measure similar to mountain sickness and balloon disease. The most important effects of this are noted in the rapid phases of elevation and descent, perhaps difference in air pressure being mostly accountable. Ten thousand feet in an hour of such altitude has been reached, producing beside breathlessness and heart acceleration, a special kind of uneasiness, which might be termed "vestibular," and which is associated with crackling and humming in the ears, burning in the face, tendency to sleep and, frequently, accompanying headache. Movements of the body are sluggish and unskillful; arterial tension is in a measure increased, and it is notable that all these characteristics disappear, both in maintaining a lateral plane of height and on

(8) Ann. Otol., Rhinol. and Laryngol., September, 1914.

reaching earth, their greatest effect, secondary, to ascent and descent being noted when passing near the earth.

The aviator educates himself to a regular rhythmical coördination, attuned to his machine. His "lift" or lightness, in a measure, might simulate the ecstatic type of lift we feel, under the influence of subordinated self-consciousness occasioned by beautiful music, superb art, stimulating odors, etc. His machine's balanced glide continues, under the influence of the subconscious accommodation of his vestibular sense to the conditions of flight. The suggestion of importance that Babbitt makes is the possible influence of the other portion of the labyrinth—the acoustic portion. The dull, steady, monotonous vibration of the motor would tend to absorb through reflex transference, other special sense activity. Is it not reasonable that conditions, such as are noted above, perhaps in four or five of the great flight catastrophies of this country, have called attention aside from this monotonous and consistent adaptation and introduced a self-conscious direction which has destroyed control? The query arises as to whether or not a deteriorating functional activity of the vestibular canals, the possible influence of a deeply thinned tympanic cavity and deficient circulation, may prove an important complement in the qualifications for safe aviation.

Vibration Treatment of Ear Disease. L. M. Hubby⁹ has made extensive observations on the treatment of ear disease with sonorous vibrations. He lays down the following principles:

The application of sonorous vibrations not too long continued and not too intense has a stimulating effect on the metabolism of all living cells. This action is a pneumovibratory massage. Applied to the ear it affects the external auditory canal directly, the tympanum through the membrana tympani, and the internal ear and cochlear nerve-system through the ossicles, oval window and, to a much less degree, through the tympanum and the round window.

All the structures of the auditory apparatus degenerate when insufficiently exercised; hence the necessity of intensive exercises when any of them are crippled.

Sonorous vibrations exercise the membrane tympani, the tympanic ossicles and muscles, the hair-cells of Corti's organ and membrana tectoria, and the entire cochlear nerve-system. Such exercise not carried to the point of fatigue increases the nutrition and efficiency of these structures.

The parts of the auditory apparatus or system, like those of other systems or organs of the body, are closely connected by the sympathetic. Metabolic changes in one part produce similar changes in allied parts. Thus, acute circulatory changes in the tympanic mucosa produce similar changes in that of the Eustachian tube, and vice versa. This probably explains the improvement in the Eustachian tube after treatment directed at the tympanum.

The Zund-Burguet electrophone was used in all Hubby's treatments and experiments. With this instrument siren-like scales may be produced in three timbers, corresponding to three registers of the human voice, low, medium and high. These registers may be lowered or raised, but they should be adjusted so that the scale of each overlaps that of the adjacent register. Each register has a scale of over an octave, and the sum of all the registers is a little less than five octaves, which is about the conversational range. If the harmonies and overtones produced are also considered, possibly the eleven octaves of human auditory perception are reached in the exercises. The latter consist in the production of scales in each register, either applied to one ear at a time, or first to one ear and then to the other in each register or, as is usually done, alternately, first to one and then to the other ear while playing each scale in each register. Zund-Burguet produces two scales, once in the low and once in the high register, and three times in the middle register, at each treatment. Thus he starts in the middle register, proceeds to the low, then back to the middle, then up to the high and finally back to the middle register. The treatment is completed by a short mechanical massage near and over the ear to overcome any slight numbness induced by the sonorous vibrations. The intensity of the vibrations to each ear can be regulated, and also changed gradually or suddenly during

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the scales on each ear seriatim. By this method, each note is produced for only a small fraction of a second (less than one-eighth of a second in the usual three-minute treatment) and each note is sounded at least twice for each ear.

The regulation of the intensities of the sounds used is exceedingly important. Zund-Burguet as a general rule uses waves of not quite sufficient amplitude to cause a prickling sensation in the ear. There are many cases, however, in which no prickling sensation can be produced by the instrument used and yet the intensities of the sounds are sufficient to cause tinnitus and decreased audition. Therefore each case must be carefully studied and the intensities of the sounds graded to bring about the maximum improvement. To accomplish this in these cases, it is necessary to make tests before and after treatment for several days until the correct dosage is determined.

RADIOTHERAPY.

W. S. Bryant¹ finds in radium a means of accomplishing two urgent requirements in otology; first, the stimulation of cell-growth; and second, the destruction of cells. In the majority of chronic otologic cases, the desiderata are the proliferation of normal tissue cells and the destruction of new-formed cellular and cicatricial tissues. Radioactive therapy presents these two desirable and diverse modes of action, which can be used either singly or together. Often we wish to use both of these processes at the same time in the same ear.

In hypertrophic and cicatricial states the destructive action of radium is desired; in atrophic states the stimulating effect is desired. The destructive action of the radium is sought particularly in cicatricial states of the middle ear or in degenerations of the auditory nerve and labyrinthine mechanism. In atrophic and degenerative states, atrophic middle ear catarrh, otosclerosis and auditory neuritis and labyrinthitis, the action desired is stimulation of the growth of the remaining nor-

(1) Med. Record, Aug. 29, 1914.

mal cells as well as the destruction of the pathologic tissues.

There are four processes apparent in the action of radium in ear diseases and they are of varying importance: (1) the presence of the radium capsule in the auditory canal acts as an irritant, as any foreign body acts; (2) the heat evolved by the radium has a warming effect on the meatus; (3) the electrical activity of the radium ionizes the surrounding matter; and (4) the radiation of the radium produces diverse effects, depending upon the individual and upon the dosage. The rays of radio-active substances are of three kinds. The shallow, penetrating, slow *a* rays act only as a superficial destructive agent. Their action is not desirable in the treatment of ear disease, and therefore they should be eliminated by filters. Another variety of rays are the rapid *y* rays. These rays penetrate deeply and break up into *B* rays. The various intermediate rays between the *a* rays and the *y* rays are the *B* rays. These *B* rays are now considered the most important therapeutically. From an otologic point of view also these rays are most significant, for to them are attributed the two apparently antagonistic activities of stimulation of desirable tissue on one hand and destruction of undesirable tissue on the other hand. Bryant uses mesothorium bromide because it is the richest in *B* rays.

In the use of radium for the treatment of diseases of any kind, precise care should be exerted in every possible direction, so that there may be no over-use or misuse. The reaction of the individual must be carefully watched and determined; the dosage of the application must be nicely gauged; and the equation of the applicator used must be carefully studied. Because of the comparative newness of the treatment there is practically no literature on the use of radium in ear diseases.

The amount of reaction to the radium can as yet be determined only by careful experiment. We can, therefore, see the importance of the utmost caution in the employment of radium lest we do more harm than good. Over-use shows in deterioration of the hearing. In the use of radium the first effort should be to avoid damaging anything.

The technique of the radiation depends on the kind of radio-active substance used, its concentration, on the amount used, its area, the distance of application, the filterage, and the length of exposure. The applications should always commence at a minimum and be gradually increased, the time and length of an exposure being governed, of course, by the result of the previous exposure. The intervals between the applications should also be carefully graded. The greatest difficulty in the appropriate dosage of radium is the fact that the effect may be long delayed and may not appear for months after the application. Every applicator should be considered an entirely new instrument. Each applicator has its own equation; it must be studied separately and its effect measured. Other applicators, even though containing the same amount of radio-active substance, are only a very general guide to an applicator, for the minute individual variations make a great deal of difference in the results. The applicator Bryant uses is a glass tube containing 5 milligrams of mesothorium bromide wrapped in thin tinfoil. The applications are made in the auditory canal.

Apparently the only conditions in which there is no indication for its use are those in which the functions of the ear are normal and those in which the labyrinth has been entirely destroyed, and all function annihilated; in other words, when there is nothing to use radiation for and where there is nothing to use radiation on.

The author submits a report of twenty cases in which the result was generally satisfactory.

THE NOSE AND THROAT.

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DISEASES OF THE NOSE AND THROAT.

DISEASES OF THE NOSE.

EXTERNAL NOSE.

Osteoplastic Surgery of the Face. W. Wayne Babcock¹ in an article on osteoplastic surgery of the face writes that the modifications the facial contour undergoes in the adult are dependent chiefly on alterations in the amount of subcutaneous fat. In the operative modification of the facial contour no substance is so well adapted for the purpose as adipose tissue. Bits of free homoplastic fat when properly imbedded subcutaneously find ready attachment, do not provoke serious inflammatory reaction, and retain, after vascularization, their storage capacity for hydrocarbons. Transplanted fat may, under conditions of increased nutrition, undergo a certain amount of hyperplasia, and may waste during starvation. The transplanted fat when vascularized remains fixed in position and, unlike paraffin, when imbedded under the skin shows little change in outline, does not produce hyperemia of the overlying skin or marked fibro-connective tissue formation.

Fat may be implanted for bony disfigurements, as after impacted fractures of the malar or frontal bones, after disfiguring operations, as on the frontal sinuses, and for certain congenital or acquired deformities such as receding chin, asymmetry of the maxillary bones, and similar conditions. For the subcutaneous imbedding of fat the cutaneous incision need not be large, and should, if possible, be placed at some inconspicuous point as along a normal wrinkle line or beneath the jaw. The subcutaneous tissues are separated by a knife or by tunneling with

(1) *Jour. Amer. Med. Ass'n.*, Jan. 16, 1915.

blunt-pointed scissors. After arresting hemorrhage, bits of fat of sufficient size to correct the deformity are introduced and held in the pocket, which obviously must be of proper size and situation, by subcutaneous sutures of fine catgut. Babcock has usually found it undesirable to suture the fat in position, as this prevents the adjustment of the imbedded fat to the containing cavity. The fat may be introduced in the form of small portions or strips and the subcutaneous closure should be tight enough to prevent any extrusion of the fat from the limiting pocket. The skin is finally approximated by an intracuticular or very fine epidermic suture. Fat may be obtained from the adjacent subcutaneous tissue or from the abdominal wall.

For the correction of saddle-nose, in which the bridge of the nose has been lost without destruction of the tip or alae, Babcock claims that a satisfactory bridge can be formed of metal, cartilage, or bone. Portions of a rib, costal cartilage and tibia have been employed, the last method presenting certain advantages. An incision about one inch long is made from the base of the nose upward in one of the wrinkle lines of the forehead and is carried to the bone. With blunt-pointed scissors or a separator carried close to the nasal bones, the soft tissues over the bridge of the nose are thoroughly separated and elevated. A tibial transplant is removed, cut to appropriate shape, and after arrest of oozing is slid into position from the frontal incision, its ends respectively abutting against the frontal bone, and the cartilage just a short distance above the tip of the nose. If necessary, two or more short strips of bone may be superimposed. The deep tissues are closed with fine catgut and the skin by subcuticular or delicate epidermal sutures. This operation has the advantage of simplicity, of slight disfigurement, and of a location of the incision in an area susceptible to sterilization. Local anesthesia suffices.

Use of Scapula in Correcting Nasal Deformity. A strip of bone 2 inches long and about $1/25$ of an inch wide was removed by O. A. Lothrop³ from the free vertebral border of the scapula with bone-cutting forceps and wrapped in wet, sterile gauze. The

attachments of the muscles were first cut from the border and from the external and internal surfaces, great care being taken not to denude the bone of its periosteal covering. A subdermal passageway was made in the nose bridge extending to the distal extremity of the nasal bones. At this point the periosteum of the nasal bones was cut and elevated along the crest of the nose bridge up to the frontal bone. The nasal bones were then ground down with a rasp. The graft was inserted through this passageway and under the periosteum until the end reached to the frontal bone. In three weeks the graft was quite solid and in four weeks it was very rigidly held in place on the nasal bones and the dressing was omitted.

SEPTUM.

Reconstruction of the Nasal Septum After the Submucous Operation. J. A. Babbitt⁴ presents a paper on the reconstruction of the nasal septum after the submucous operation, and his conclusions, deduced from a careful study of his cases, are:

1. A submucous resection, properly and completely done, will reconstruct a perfect, functional septum.
2. If a careful superior margin be left, even with scant anterior and posterior sthenic removal, the alignment in the nose externally and internally will be satisfactory and adequate.
3. If the bulging extremities of the nasal tubercles, ridge, and vomer, when obstructing the nares, are not relieved, the result of the operation is unsatisfactory to the patient.
4. The removal of posterior pressure is more important than a harmonious anterior picture, and unequal space in front does not necessarily disturb respiratory and drainage functions.
5. Fresh anastomoses will restore obliterated vessels to the extent of presenting a normal vascular septum if traumatism has not been unreasonable.
6. Areas in which mucous tissues are lost and replaced by squamous epithelium will probably crust, allow occasional intermittent hemorrhage and irritate the nose.

7. Perforations may be avoided if at least one firm side of mucous membrane is allowed to remain intact.
8. In soft, collapsible roof and sides a greater margin of cartilaginous and bony ring should be left to support the flexible nose and prevent drooping.
9. Drainage and perforation posteriorly will not injure the nose and will prevent exudate and hematoma of the septum.
10. Pressure of pads and splints should be avoided by protection of their surfaces and adequate judgment as to amount easily tolerated.
11. Reflex and other symptoms associated with the indication for operation will gradually disappear completely in a large percentage of cases.
12. Submucous removal is the method of preference for all septal procedures, and when carefully and completely performed may afford immeasurable relief.
13. The natural secretion of the nose will prove sufficient for post-operative antisepsis.
14. The new fibrous replaced septum bears approximately the same relation to the perichondrium and periosteum as before.
15. There is no evidence that the softer re-organized septum carries any functional disadvantage, even in its vasomotor relations.

ACCESSORY SINUSES.

Pathology of the Ethmoid Labyrinth. G. E. Shambaugh⁵ writes that the most frequent pathologic condition involving the ethmoid labyrinth is acute catarrhal ethmoiditis. This develops as a frequent sequel to acute coryza. The changes in the mucous membrane covering the ethmoid which are characteristic of this condition can often be observed by an examination of the middle meatus where the ethmoid labyrinth comes more or less clearly into view. In these cases by inspection one can recognize along the under surface of the middle turbinated body, along the unciform process, and along the exposed surface of the bulla ethmoidalis, an edematous-

(5) Jour. Amer. Med. Ass'n., Dec. 12, 1914.

like swelling of the mucous membrane. Occasionally one observes in this acute form of ethmoiditis the formation over the exposed part of the ethmoid of small mucous polypi, which tend to disappear spontaneously on the subsidence of the acute process.

An occasional sequel of catarrhal ethmoiditis is the occurrence of a closure of an ethmoid cell, with retention of secretion, over a considerable period. It is associated with a sensation of fulness or pressure in the region of the ethmoid.

An acute purulent involvement of the ethmoid labyrinth, acute empyema, is not so common. In these cases the profuse discharge of pus into the nose may be associated with a great deal of pain, caused primarily by impaired drainage from the ethmoid cells. The result of the impaired drainage is the same in the acute empyema of the ethmoid as when this condition develops in acute empyema of the mastoid; the bony framework becomes involved. With the softening of the bony walls of the ethmoid there is likely to develop an extension into the orbit and, finally, an external fistula, which is usually located either just above or just below the inner canthus of the eye. When the ethmoid bone becomes involved in cases of acute empyema of the ethmoid the process is certain to persist as a chronic empyema unless the diseased bone is thoroughly removed by operation.

Of the chronic pathologic conditions involving the ethmoid, Shambaugh says that the most common and often the most troublesome form is chronic hypertrophic ethmoiditis. This is primarily a non-suppurative disease, but with the impaired drainage of the ethmoid cells, which the hypertrophy of the mucous membrane produces, the condition may become the seat of a secondary suppuration which persists after an acute infection as a chronic empyema. According to Shambaugh, the first change that takes place in the hypertrophic form of ethmoiditis is in the mucous membrane, which undergoes a polypoid degeneration. This involves the mucous membrane lining the ethmoid cells as well as the covering of the nasal wall of the ethmoid, especially the unciform process and the bulla ethmoidalis.

Later, the ethmoid bone itself becomes involved. The changes in the bone are the result in part of re-absorption of the bone, and in part of newly formed bone, the former, as a rule, predominating. The symptoms by which the hypertrophic ethmoiditis can be recognized are characteristic. The patient complains of symptoms of almost continuous acute head cold, attacks of sneezing associated with profuse watery discharge from the nose, sensation of fulness and pressure between the eyes, etc.

The chronic empyema of the ethmoid cells occurs: first, by the persistence of an acute empyema, because of the involvement of the bony framework when the drainage has been seriously impaired; second, by an acute infection taking place in the presence of a hypertrophic ethmoiditis—here the impairment of drainage keeps up the process as a chronic empyema.

There is a chronic atrophic form of ethmoiditis seen, as a rule, in connection with a general atrophic process throughout the nose. In these cases, the atrophy apparently begins in the mucous membrane of the ethmoid but, just as in the remainder of the nose, this atrophy is associated with atrophy and shrinking of the bony framework. The atrophic process is, as a rule, bilateral, but it is not uncommon to find the disease limited chiefly to one side of the nose.

The aberrant ethmoid cells which occasionally develop in the middle turbinate body may become the seat of a chronic inflammatory process, just as may any other ethmoid cells. In most of the cases of cystic enlargement of the middle turbinate body the cell is free from any secretion.

Tertiary syphilis not infrequently involves the ethmoid, with extensive bony necrosis. In these cases the orbit is usually sooner or later involved and an external fistula forms in the region of the inner canthus.

The development of a primary malignant growth in the ethmoid labyrinth is occasionally observed. The first symptoms in these cases are likely to be those produced by a secondary involvement of the orbit, while in the nose there may be relatively little to indicate the serious character of the disease.

Clinical Classification of Ethmoiditis. E. M. Holmes⁶ pleads for the conservative methods of treating an involvement of the ethmoid although stating that "in extensive ethmoid diseases it may be absolutely impossible to stop the progress or to give relief without thorough exenteration." And when such conditions are present the most thorough exenteration is none too radical and must be advised. Clinically, Holmes classifies the pathology of the ethmoid into two classes, the purulent and the non-purulent. The purulent may be either acute or chronic. The non-purulent may occur as an acute inflammatory, a chronic inflammatory, a degenerative (polypoid and atrophic), a syphilitic, a tuberculous or a neoplastic. The purulent or non-purulent types may occur independently or may be associated. The acute inflammations are extremely common and are usually associated with attacks of acute general rhinitis. The majority are self-limited. They are often the most difficult to diagnose as the symptoms are frequently the only real guide, and when the drainage is not materially obstructed the symptoms may be so slight that the condition is overlooked. When there is associated purulent secretion which can be observed coming from some of the ostia, the diagnosis is easier and more positive, but more frequently the secretion if excessive is mostly serum and it is practically impossible to state positively from what area it is coming. It spreads out over the mucous membrane of the turbinates and fossae and discharges from the nose anteriorly or into the epipharynx posteriorly.

The symptoms in this condition are usually not severe until some of the channels of escape become blocked by the swollen mucous membrane. When there is a blocking of excessive secretion from the ethmoid cells there arises a sensation of fulness and heaviness within the head and there begins a more or less severe pressing pain which radiates from the eye and often extends into the temple, the parietal, and sometimes into the post-auricular areas. All the visible mucous membrane within the nose is usually infected and more or

less swollen, as the results of the infective process usually spread over quite an extensive area.

The important objects to accomplish according to Holmes are first to relieve the distressing symptoms and to relieve pressure within the bony encased areas so that normal circulation may be established and the inherent vital forces given a chance to combat these infective elements and restore normal conditions as quickly as possible. The more rapidly and perfectly this takes place, the less liable is there to be a weakened resistance or a chronic termination.

In acute cases in which cocaine and epinephrine establish drainage and give relief to the symptoms, the local use of these with the addition of argyrol is usually sufficient to effect a recovery in a comparatively short time. There are cases with acute onset in which it is impossible to establish drainage and give relief by local application, and more radical interference may be necessary.

Chronic suppurations of the ethmoid vary much in degree and in severity of symptoms. The purulent secretion within the nose is frequently very annoying, and that which flows backward into the epipharynx and into the pharynx may be very distressing when profuse, and extremely disagreeable when it is retained and forms decomposing crusts. The irritation of the mucous membrane within the nasal chambers with the resulting swelling frequently impedes the passage of air. There is often pain over the bridge of the nose or radiating from the nose to the temporal region. There are at times disturbances within the orbit. Frequently the complications within the epipharynx, and Eustachian tube produce the only severe symptoms. Quite often there is more or less enlargement of the normal cellular spaces because of retention of hypersecretion, and frequently these cells become much distended. This is especially true of the middle turbinate. When the condition is at all advanced, the cystic turbinate obstructs the nasal passage and produces the symptoms due to obstruction. The chronically inflamed ethmoid when subjected to excessive pressure from retained secretion frequently becomes necrotic. If this necrosis happens to break down the cell walls so as to produce good drain-

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age, the process is occasionally self-limited. This is not, however, the general course of events. There usually develops more or less profuse granulation-tissue which tends to retain the secretion, and unless aided by surgery the process slowly advances. In this condition the middle turbinate may become so cystic and enlarged as practically to fill the superior fossa and obscure the direct or endoscopic inspection of the middle and superior fossae of the nose. Pus may be seen in the groove about the turbinate, but it is impossible to determine its original source. The increased space obtained by reduction of the turbinate may enable direct treatment and a cure may result with little sacrifice of tissue and slight, if any, loss of function. When there is excessive degeneration and necessarily much loss of structure one can hope for relief but not a restoration of a normally functionating nose.

Polypoid formation as well as the hypertrophic inflammatory processes may begin as very circumscribed conditions and without purulent manifestations. Polypoid formation may exist for years and become very extensive without becoming purulent. So far as the ethmoid is concerned, the mucous polyp is practically a malignant manifestation. Unless there is thorough removal of the growth together with the adjacent structure, there is almost sure to be a return of the condition. Little can be expected from a simple snaring of the polypoid mass, and in advanced cases permanent relief can be hoped for only through a radical exenteration of the ethmoid.

Syphilitic disease of the ethmoid may at first appear as a simple, acute or subacute inflammatory process. Later it may give symptoms and show the signs of a purulent ethmoiditis. Holmes believes it is important in all ethmoid disease to consider and estimate the possibility of syphilitic infection. When there is a chance of the ethmoiditis being due to syphilitic extension, surgical interference should never be resorted to until after thorough anti-syphilitic medication.

Neoplasms of the ethmoid other than polypi are very rare, and when discovered are frequently beyond eradication. Whether of the sarcomatous or carcinomatous type they are usually friable and very vascular. Any

soft vascular tumor within the nose should arouse suspicion and receive immediate attention.

Anterior Ethmoiditis in Orbital and Ocular Diseases.

L. H. Clark⁷ states that there are three routes through which infection may be conveyed from the sinuses to the eye: by continuity, by way of the blood-vessels, and by way of the lymphatics.

Dehiscences in the outer wall of the sinuses admit of conveyance of infection from the ethmoid to the orbit. The arterial and venous supply of the ethmoid and orbit are intimately connected, especially by way of the lachrymal plexus. While there is a very intimate connection of the lymphatic systems there is some uncertainty as to whether infection is conveyed by this means. The forms of involvement of the eye are many and depend on the variety and severity of the ethmoid trouble. The ocular symptoms may be divided into intra-ocular and extra-ocular. The latter are cysts of orbit, neuralgia, displacement of the eye-ball and disturbance of its motility and function, orbital abscess, cellulitis, periostitis and conjunctivitis. Of the intra-ocular complications there may be present dilatation of the pupil, surcharging of the retinal vessels, asthenopia and changes in refraction. Headache is a common symptom, of variable intensity, usually most pronounced in the parietal and occipital regions. There may be burning and lancinating pains about the orbit and over the root of the nose. Vision may be weak, sometimes due to weakness of the internal rectus muscle. Dizziness and vertigo are common. The non-purulent form of sinus disturbance in which the intra-nasal signs may be negative is emphasized by Clark. The presence of edema in the region of the middle turbinate is considered a sign of importance as is also the periodical discharge of a clear fluid at times when the head is thrown forward. The neuralgic headaches are worse in the morning and after lying down. They simulate eye headaches and are brought on or aggravated by using the eyes.

Operation on the Maxillary Sinus. R. H. Skillern⁸

(7) Jour. Oph., Otol. and Laryngol., May, 1914.

(8) Laryngoscope, November, 1914.

gives the technique of his pre-turbinal operation on the maxillary sinus:

1. The nasal cavities on both sides are cleansed by douches of warm normal saline solution.

2. The entrance to the nose, including that portion immediately in front of the anterior attachment of the inferior turbinate both above and below, is anesthetized by painting with a solution of cocaine, 20 per cent, to which 1/5 its volume of adrenaline chloride (1 to 1000) has been added.

3. When the anesthetization is complete a solution containing novocaine 1 per cent., adrenaline chloride 1 to 10,000, peptone pure 10 per cent., normal salt solution 89 per cent. is injected beneath the mucosa on the nasal side of the pyriform aperture and subperiosteally on the facial side of the same structure, so that all that region around the anterior attachment of the inferior turbinate as well as the inner portion of the canine fossa wall will be desensitized. It will not be necessary to use much over 5 or 6 c.c.

4. After waiting about ten minutes, a perpendicular incision is made slightly in front and above the anterior end of the inferior turbinate extending well into the floor of the nose. This incision should sever all tissues down to the bone. A second incision is made directly back of this, meeting the first one above and below so as to excise a spindle-shaped piece of mucous membrane.

5. After controlling hemorrhage with adrenaline tampons, a small elevator is used to raise the periosteum from the crista pyriformis both externally toward the canine fossae and internally toward the inferior turbinate until a sufficient portion of the bone is exposed.

6. The antrum is next attacked with a chisel having a concave surface, by applying it to the crista pyriformis first above, then below, removing the loosened bone with a pair of strong forceps. While the antrum may be opened by continuing this method, Skillern believes that it is better to substitute an electric trephine, as a smooth, round opening is thus obtained and insures against spicules of bone being driven into the sinus.

7. The opening is enlarged to any desired size by means of the ordinary curved, frontal sinus rasps.

8. The sinus is flushed out and after being dried is packed with a thin strip of gauze saturated in the cocaine adrenaline solution which is allowed to remain for five minutes. This not only anesthetizes the mucosa, but also by its hemostatic action clears the cavity of blood and permits a much more satisfactory inspection of the interior.

9. An ordinary hard rubber ear speculum is introduced into the opening and the antrum thoroughly inspected for polypoid degenerated mucosa, areas of granulation tissue, necrotic spaces, etc. This procedure is readily accomplished if sufficient bone has been removed. The naso-pharyngoscope is used for inspection of the roof, lachrymal region and ostium.

10. A curette is introduced and all portions of diseased and degenerated mucosa are removed, not overlooking the floor, postero-inferior and antero-superior angles; the latter can only be reached by a right angle curette.

11. The interior of the sinus is again inspected, using cotton or gauze pledges dipped in pure adrenaline chloride when necessary for cleansing purposes. If all polypoid tissue seems to have been removed and the cavity is clean, it is again irrigated and after the fluid is allowed to run out, it is packed loosely with iodoform tape.

After-Treatment: The gauze is removed in from forty-eight to seventy-two hours, depending on the amount of secretion. If it remains moderately dry it can be permitted to remain even as long as one week. After its removal the cavity should be cleansed by irrigation and lightly repacked with iodoform gauze. The treatments are continued every second day for from ten days to two weeks when the packing can be permanently discontinued.

The treatments (irrigation and insufflation) are continued at increasing intervals for about four weeks, when in ordinary cases the patient is discharged cured.

The advantages Skillern claims over other intranasal procedures are:

1. The sinus can always be inspected either directly

or through the nasopharyngoscope and the progress of healing noted.

2. The drainage is at the lowest and most accessible point reached through the nose.

3. Local applications directly under vision can be made to diseased areas which have proved resistent to treatment.

4. The inferior turbinate is not only preserved in its entity, but remains uninjured.

5. The operation is practically painless if the anesthetization is properly carried out.

6. The period of healing is considerably shortened and the number of after-treatments greatly decreased.

Maxillary Sinusitis of Dental Origin. G. W. Mackenzie⁹ says that acute maxillary sinusitis of dental origin differs in many respects from that of endo-nasal origin, and requires different treatment. From the combined statistics of many authors, Mackenzie believes that the maxillary sinusitis, in 20 per cent. of cases, is due to some infection from the teeth. Sinusitis is more apt to occur secondarily to tooth-infection in those cases in which the roots are more or less exposed in the floor of the sinus, the infection traveling up through the pulp and spical foramen into the sinus. Infection of the sinus may, however, occur by a more circuitous route, *i. e.*, primary carious infection of the tooth, followed by periostitis and osteitis, and thence spreading to the sinus. It is possible for infection to spread through the circulatory or lymphatic streams from the teeth to the sinus.

The treatment in these cases should be directed primarily to the teeth and the alveolar process about the region of the offending teeth. Such cases should be treated by the combined efforts of the dentist and rhinologist. In many of these cases, the dentist alone is able to succeed. In the more chronic cases, he will succeed better with the assistance of the rhinologist.

Foreign Bodies in the Maxillary Antrum. W. Zemann¹ does a submucous resection of the lateral nasal wall for the removal of foreign bodies from the maxil-

(9) Jour. Ophth., Otol. and Laryngol., May, 1914.

(1) Zeitsch. f. Laryngol., vol. 6, No. 6, 1914.

lary cavity. He exposes the lateral nasal wall by elevating the nasal mucous lining, beginning from the aper-tura pyriformis. By means of a small chisel, a small opening is made in the bony wall, whereby care is to be taken not to injure the mucous lining of the antrum. A separator is introduced and the antral lining elevated; thus exposing the lateral bony nasal wall between its sac of mucous lining. The bone is removed by means of a good biting forceps and the double mucous lining incised according to the intended size of the "window."

The removal of foreign bodies from the antrum and the treatment of the antrum suppuration if present may thus be easily achieved.

Difficulties and Dangers of Exploratory Puncture of The Antrum of Highmore. According to A. B. Kelly² exploratory puncture followed by perflation and irrigation is the most reliable method of diagnosing antral suppuration, but is not so simple and safe as has been generally believed. The simplest and most satisfactory route is that of making a perforation beneath the inferior turbinate. Difficulties and minor accidents may be encountered under the following conditions: In patients under twelve years of age puncture from the inferior meatus may be unsuccessful, as the antrum at that age is usually still high. The puncture should therefore be made from the middle meatus, or the trocar should be directed obliquely upward from the inferior meatus. Important is also the configuration of the patient's face. When the nose is prominent and the anterior wall of the superior maxilla is sunken the puncture must be made further back than is usual in the inferior meatus. If this is not done, one may bore in front of the antrum or traverse a marrow part of the cavity. On inflation emphysema of the cheek may be produced, or severe phlegmonous cellulitis may follow infection of the tissues. Patients with atrophic rhinitis present great difficulties, as they seem to have a thick naso-antral wall or a small antrum.

There are several conditions which prevent inflation of the antrum. The following are possible causes of obstruction: In acute cases the ostium may be blocked.

If cocaine and adrenaline fail to reduce the swelling of the mucous membrane around the ostium a second cannula should be inserted alongside the first and made to serve as a counter-opening. Sometimes a polypus in the antrum may occlude the ostium. Here obstruction may sometimes be avoided by changing the position of the patient's head.

In cases in which the antral lining is greatly swollen and thickened the point of the cannula may readily be imbedded in the edematous tissue. If this is suspected the instrument should be pushed forward until the point meets the opposite wall and then slowly withdrawn, meanwhile trying to blow through. Sometimes a dental cyst may fill the entire antrum. The instrument will pierce the cyst, but attempts to blow through will be futile.

The author warns against blowing strongly enough to force a passage through the ostium, whatever the intra-antral condition may be. He describes a case in which one of his patients succumbed from the effects of forcible perforation. A dry cough, perspiration, faintness and considerable prostration should warn of approaching danger.

Intranasal Operations for Frontal Sinus Suppuration.
Watson-Williams³ in a paper on this subject states:

1. Whenever operative measures are called for, an efficient intranasal operation, if that be possible, is to be preferred to external operation, unless (a) symptoms indicative of intracranial complications or of bone necrosis or osteomyelitis are present; (b) or there exist ocular complications which render anything short of a complete radical operation a source of increased risk to the patient.

2. Patients are seen with frontal sinusitis who require no operation at all, while of those who do a certain percentage recover completely with simple catheterisation and lavage after anterior middle turbinectomy.

3. Certain anatomic conditions must always impose limitations on the efficacy of any possible intranasal operation.

He discusses (1) the relative value of various methods of operating intranasally for frontal sinus suppuration as measured by the increased percentage of cure of efficient relief afforded thereby; and (2) their relative merit from the standpoint of safety.

Examination of a number of skulls brings home the fact that clinically the ethmoid cells are not strictly confined to the ethmoid bone. The eminence of the agger on the upper part of the inner surface of the nasal process of the superior maxillary bone is usually cellular, then the one or two most anterior cells correspond to the agger nasi, while the inner surface of the lachrymal and nasal bones close the anterior cells of the ethmoidal labyrinth which run in front of the fronto-nasal duct right up to the bony ring of the frontal sinus ostium in the internal angular process of the frontal bone. Williams speaks of the groups of cells lying in front of the middle turbinal body as anti-conchal cells. The term "agger cells" (which are not always present) he restricts to cells in the agger.

The frontal sinus ostium is a bony ring bounded in front by the posterior margin of the nasal crest. The nasal crest, projecting backwards, forms the sloping floor of the sinus in front of the ostium.

The vertical plate, the middle turbinate, descends from the under surface of the cribriform plate, which lies to its inner side above, and terminates below in a free convoluted margin in the middle turbinated bone. As the vertical plate forms the inner boundary of the anterior ethmoidal cells Williams tends to avoid risk of injury to the cribriform plate by retaining the vertical plate, restricting all operative measures to its outer side. But it is worthy of note, he says, that the cribriform plate does not extend forward beyond the tabula interna, and that the anterior border of the middle turbinal body is in front of the anterior end of the cribriform. The outer boundary of the ethmoidal labyrinth in this region is formed by the lachrymal bone. The width of the potential passage between the inner and outer boundaries varies with the development of the intervening cells, but in its narrowest part corresponding approximately with the level of the inner canthus.

Williams finds that in the adult it measures from 7 to 12 mm., therefore the width of an instrument intended to clear the space of obstructive cells should not exceed 6 mm., while in some patients it must be less or it will pierce the orbital wall.

Williams considers the relations of the lachrymal sac and canal to the operative tract. The lachrymal duct lies below the operation field, but the lower level of the sac corresponds to the agger nasi, and the upper limit of the sinus lachrymalis often reaches the level of the cribriform plate or to the thick upper end of the nasal bone at its junction with the crista nasalis of the frontal bone. Hence it seems better to use blunt-nosed forceps to clip away the projecting walls of anti-conchal cells.

In patients whose fronto-nasal passage is obstructed all the fronto-ethmoidal as well as the agger cells may be thrown into one, thereby creating a direct opening to the frontal sinus ostium above and in front of the middle turbinal. It is surprising how free and large an approach to the frontal sinus ostium is at once obtained in this usually simple manner, and if the frontal sinus ostium is too small, it may then be safely enlarged toward the front by partial removal of the nasal crest by fine burrs rather than by chisels, which would more readily enter the orbit, besides introducing a source of grave danger to a low-lying posterior frontal sinus wall.

Williams describes his own operation as follows:

1. With small angular ethmoidal forceps the anterior margin of the middle turbinal is engaged at its point of attachment to the outer nasal wall. Cutting through this the forceps enter the anterior ethmoidal cells in front of the fronto-nasal passage. (Plate XIa.)

2. Keeping to the outer side of the vertical plate of the ethmoid, all the agger cells and the other anti-conchal cells are clipped away right up to the nasal crest.

3. The anterior ethmoid cells lying behind or above the fronto-nasal duct are next removed by the forceps. One can readily clip the cells as far back as may be necessary in any particular case, from the bulla to the sphenoidal sinus, without anterior turbinectomy.

4. Using the larger forceps, the thicker projecting partitions of the cells are punched away. Only the blunt tip of the female blade can come into contact with the roof.

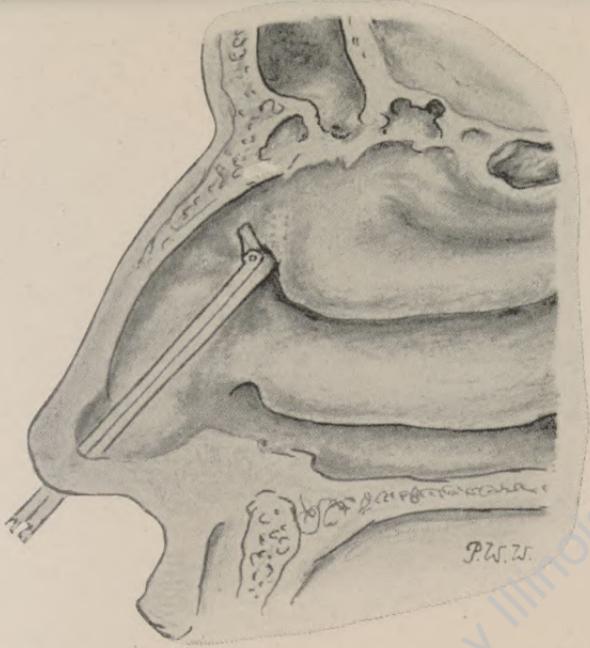
5. The bougies are then passed into the sinus, so as to gauge the size of the fronto-nasal channel thus formed. Usually Nos. 18 or 19 will enter, sometimes 19-23, or 19-25. (The figures give the circumference in millimeters, hence, No. 19 has a diameter of 6mm., or $\frac{1}{4}$ inch. A 19-25 bougie measures 6mm. in width and 8 in antero-posterior diameter.) If such a large bougie will not enter, the bone corresponding to the nasal crest may be shaved away by the sliding cutting forceps till these large sizes can be introduced, or the crest reduced first by the smaller guarded burr or a small-sized sharp raspatory, till the passage admits the burr or forceps. When a No. 10 enters the sinus the bony boss can be burred away with the 4mm. guarded burr until it enters the sinus, when it is made to burr the crest from above downwards. When the frontal sinus opening lies well to the outer side and tends to guide entering probes towards the orbital roof, unless contra-indicated by skiagrams it is well to draw the strong forceps or burr toward the front so as to enlarge the frontal ostium to the front and inwards rather than towards the orbital roof outward. (Plate XIb.)

6. With the small forceps which now enter freely, the projecting walls of any ethmoid cells which remain may be clipped away to render the passage more free.

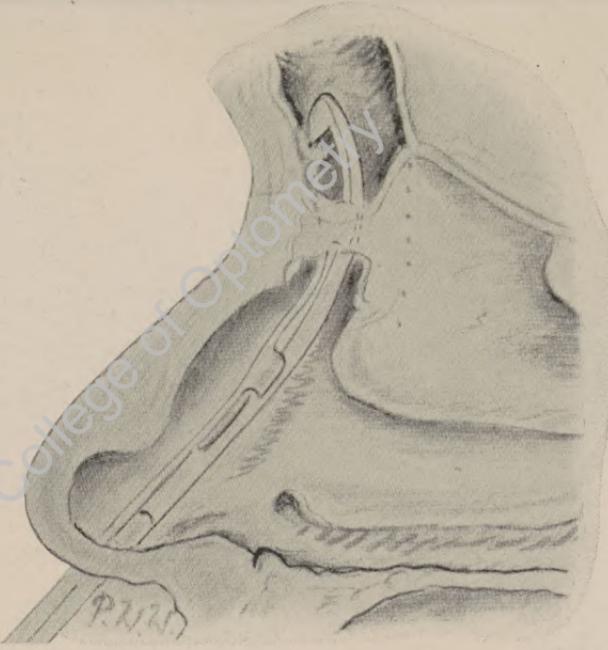
7. The sinus is well lavaged at this stage, and, finally the anterior end of the middle turbinal may be removed, as when it is left intact the channel may be narrowed by subsequent granulations. Particularly with acute infection it may be safer to defer removing any part of the middle turbinal for a few days till lavage has partly sterilized the sinus.

Frontal Sinus Suppuration. Lothrop⁴ gives his method of closing the wound in frontal sinus suppuration.

After the vicinity of the ostium has been enlarged to as great an extent as the anatomy will allow, he



a. To show the initial point of entry in the intra-nasal frontal sinus operation. The small spheno-ethmoidal forceps are seen cutting the point of attachment of the middle turbinal to the outer nasal wall, thus entering the fronto-ethmoidal cells.—Watson-Williams (see page 269).



b. The sliding cutting forceps reducing the crista nasalis and projecting bony ridges after the cells have been opened by the small cutting forceps. The middle turbinal shown in situ. The dotted line shows the forward extent of the cribriform plate.—Watson-Williams (see page 269).

Digitized by Illinois College of Optometry

sutures the edge of the skin of the upper lid to the periosteum on the outer edge of the bony opening into the sinus with small catgut; then he makes an oval incision in the lid down to the muscle fibers, so as to form a flap about the size of the opening in the bone. The blood-supply of the lid is excellent and the flap is very movable so that it turns readily without much cutting after division of the thin skin of the lid. Lothrop now turns the flap so as to cover the bony opening and sutures it to the periosteum, preferably with fine chromicized catgut. Then the parts are washed carefully with a sterile solution and the remaining wound is closed. The lid is drawn across horizontally and there is very little tension and subsequent edema, and the motion of the lid is not interfered with. In two instances in which the sinus was grafted the scar was scarcely perceptible in one and in the other the depression was moderate and was due to the previous extensive destruction of bone.

Exploratory Opening of the Sphenoid Sinus. For exploratory or diagnostic purposes C. P. Grayson⁽⁵⁾ advocates the making of an artificial opening in the anterior wall of the sphenoid at a point as close as possible to the angle of junction of its floor with its internal wall.

The inner or nasal portion of the anterior surface of the sphenoid body is exposed as widely as possible by shrinking the turbinates with one of the adrenal preparations. The field of operation is anesthetized with cocaine and then rendered ischemic by the adrenal solution. When this has been done, Grayson claims the course of the sphenopalatine artery is usually so distinctly visible that it can be readily avoided. The application of a dilute tincture of iodine will be sufficient for purposes of sterilization. The instrument with which Grayson perforates the sinus wall is a straight drill. It is tipped with a conical burr 6mm. in length and measuring 2.5 mm. from its point to its greatest diameter. The spot to which the drill is applied is 2 or 3 mm. above the line which divides the anterior from the inferior surface of the sphenoid body and close to

the attachment of the ethmoid plate in the middle line. The opening that it makes is 2mm. in diameter, a size sufficient to permit the escape of any fluid within the sinus, the introduction of an appropriate irrigating cannula or, should it seem advisable, the distal jaw of a biting forceps with which the opening may be enlarged.

Grayson believes that the possible implication of the sphenoid sinus in the etiology of certain cases of neuralgia of the fifth nerve can be quickly decided by the making of this opening.

In addition to these affections there are nasopharyngeal catarrhs, catarrhs of distinctly mucopurulent and irritative type, in which the futility of ordinary methods of treatment should suggest the exploration of the sphenoid.

Paranasal Sinuses in Explanation of Pain in the Face, Head, Neck and Shoulders. The rhinologist is frequently called upon to relieve pain in the places mentioned and as he is not always successful, any advancement in the knowledge of the causes and treatment of these conditions is most welcome. M. A. Bliss⁶ believes that the thickness of the sinus walls and the close or remote relationship of the trunks and ganglia to diseased sinuses has a constant significance.

The widespread distribution of the referred pain can not be explained on anatomic grounds, according to our present knowledge.

Bliss reports the following case, which will serve as a type of the complete picture:

Miss S., aged 27, had for several years suffered "off and on" with pain beginning at the root of the nose, involving the upper jaw and teeth (occasionally the lower jaw and teeth), extending backward to the tip of the mastoid, and most intense about 5 cm. posterior to this point. When she first came under observation, in 1906, the nose was negative in every particular. Some months later a post-ethmoidal-sphenoidal inflammation developed on the left side. Almost simultaneously the old pain, which had almost disappeared, returned. It involved the root of the nose, the cheek, the mastoid

tip and a little behind it, the neck, shoulder-blade, shoulder, and arm—all in greatest severity.

Soaking a strong solution of cocaine into the tissues overlying the sphenopalatine ganglion always stopped the pain, and the relief would often last for several days.

The pain was on the left side. The arch of the soft palate was markedly higher on the left; the uvula was deflected to the right. The soft palate and the pharynx down to the level of the lower part of the tonsil were somewhat less sensitive on the left side to contact with a lock of loose cotton. On the floor of the left nostril anteriorly cotton was not so well perceived. In the middle and anterior third of the tongue the sense of taste for sugar, sodium chloride, citric acid, and quinine bisulphate was less acute on the left than on the right.

Many exacerbations and remissions occurred. Many injections of plain alcohol were attempted. The total result was a cure. The case illustrates not only the characteristic features, but the sometimes extremely discouraging failures one must meet before getting a complete result.

Bliss remarks that these are not simple and easy cases to manage. They require painstaking investigation for correct diagnosis. Treatment is at first often disappointing. A certain dogged persistency, not always easy to maintain, is required to meet the failures and baffling eccentricities of reaction.

They are infinitely more difficult to deal with than tics or neuralgias of the second and third division, which may be cured by injection from the zygoma. The nerve fibers are readily destructible by alcohol, but the nerve cells are very resistant.

The sphenopalatine ganglion is small (5 mm.) and by no means easily struck, whether approached with a straight needle from below the posterior tip of the middle turbinate or by means of a curved needle entering through the sphenopalatine foramen, and whether or not these attempts be made under the view of the Holmes pharyngoscope, because it is impossible to know the exact position of the ganglion in any individual.

Sluder and Bliss have proved in a series of experiments on the cadaver that the ganglion or its imme-

diate environments may, however, be struck as an average procedure. Their injections were made with carmine and Prussian blue, the specimens then being decalcified and sectioned macroscopically.

The Conservative Treatment of Suppuration of the Accessory Sinuses of the Nose. E. B. Gleason⁷ presents a paper in which he defines conservative treatment as such measures either medicinal or surgical as tend to restore the normal functions of the inflamed sinuses, in contradistinction to radical operations whose object is to destroy the affected structures.

The considerable number of patients who have sought relief from conditions that they state are infinitely worse than those for which radical operation or operations were done suggested this paper to Gleason.

He quotes numerous authors in proving his points:

Stucky states: "Within the past three years I have been especially impressed with how little intra-nasal surgery is necessary to relieve the most complicated and serious conditions in which the visual apparatus presents the most alarming symptoms, and I am finding fewer cases that require the radical external operation even for the relief of suppurative pan-sinusitis."

J. J. Kyle says: "Meningitis is seldom a result of sinus suppuration, but of an operation to relieve the chronic condition."

H. Thomas claims that he has examined 1,500 cases and that, instead of sinusitis patients having optic neuritis, out of hundreds of cases of optic neuritis, but a small percentage had sinusitis, the larger majority of whom were luetic.

Simon Oppenheimer states that "if free drainage is present and there are no signs of ill-effects on the general health but only an occasional headache, and if the patient can be kept under observation, the risks of radical operation more than counterbalance the advantages." Prof. Kuemmel of Heidelberg, after reviewing a fatality following removal of the ethmoid labyrinth, says: "Unless there is some vital indication, too little is better than too much interference in chronic frontal or ethmoid sinusitis."

H. M. Goddard exhibited a so-called fulminating case of frontal sinus suppuration with exophthalmous and greatly impaired vision, which promptly subsided as the result of establishing drainage from the frontal sinus by means of Sullivan's rasps. Gleason believes this is probably the simplest method of destroying the naso-frontal duct in cases in which the frontal sinus can be probed, but when the sinus can not be probed Gleason prefers the method of Mosher.

In a series of ten cases of ethmoiditis recently treated by Gleason, eight were acute and two chronic. Of these, three patients had the anterior cells opened by Mosher's method and in one chronic case exenteration of the posterior labyrinth with opening of the sphenoid antrum was done by the Mosher method. In the second chronic case the patient was apparently cured and in the other five acute cases the patients recovered without operation.

Gleason's method of treatment in suppurative cases with pus flowing from beneath the middle turbinate and into the olfactory slit is as follows:

The parts are first cleaned by douching with normal salt solution. Pledgets of absorbent cotton saturated with 2 per cent. cocaine are then pressed into the olfactory slit and beneath the middle turbinate where they are allowed to remain for about five minutes. The operator is provided with a number of pure silver tubes about 9 cm. long. These tubes are of about the size of a frontal sinus probe, but some are slightly larger, some smaller. When screwed to the end of a hypodermic syringe they make excellent probes, as they can be bent to a curve suitable for entering the frontal and sphenoid sinus or any accessible portion of the nose.

After the cotton pledges saturated with 2 per cent. cocaine have been removed, a cannula at the end of a two dram syringe is introduced beneath the middle turbinate or into the olfactory slit and all pus removed by suction and douching. Four or five drops of some medicament (in most cases 10 per cent. argyrol) are then deposited between the middle turbinate and the external nasal wali and also in the vault of the nose through the olfactory slit. The position of the infundibulum

should be borne in mind, as it sometimes acts as a reservoir for the solution while the proximity of the nasal walls produces capillary attraction which retains the solution for considerable time in intimate contact with diseased structures in the same manner that pus is often retained in this locality. Frequently the ostium of the frontal, but more especially that of the sphenoid, is readily penetrated by the curved cannula and the sinuses cleansed and medicated if required. Often the sphenoid is penetrated almost inadvertently, but the introduction of a small amount of argyrol into a normal frontal or sphenoid sinus is apparently harmless.

A middle turbinate which is too large for the space it occupies is a common cause of recurrent attacks of congestion of the frontal sinus and ethmoid cells. It is a frequent cause of asthenopia and unilateral headaches. Even in cases in which the transillumination and the *x*-ray show a shadow in the frontal sinus and the ethmoid all symptoms sometimes disappear from removal of the middle turbinate.

Latent Empyemata of the Nasal Accessory Sinuses. Out of 300 cases of disease of the maxillary antrum operated on by O. J. Gogarty,⁸ 250 were of a chronic nature, and the majority of the patients complained of nothing more definite than "catarrh". The symptoms in the cases detailed were such that without actual puncture and irrigation of the antrum, the existence of disease in that cavity would have been entirely unsuspected. For this reason Gogarty maintains that no examination of the nose is complete without the washing out of the antrum of Highmore on each side. The author makes a vigorous protest against the operative injury of the inferior turbinate body, which he believes is followed several years later by the loss of the "air-taste" in the nose.

Post-Operative Condition of Sinuses. E. J. Moure,⁹ opened a number of frontal and maxillary sinuses previously operated on, and in which thorough curettage of the mucosa had been practiced and found the cavities entirely filled with a fibrous tissue, the bony

(8) Brit. Med. Jour., Dec. 12, 1914.

(9) Rev. hebd. de laryngol., April 4, 1914.

walls themselves having apparently grown towards one another. The sinus seemed to have disappeared.

Moure believes that a mutilating operation, in which an effort is made at once to obliterate these cavities is not necessary. The important point is that the whole mucous membrane should be removed. After complete curettement, the cavities should be wiped with a 10 per cent. solution of chloride of zinc to complete the destruction of any remaining mucous membrane.

In chronic frontal sinusitis it is important that the ethmoidal cells should be cleared by way of the natural passages and this should be the preliminary stage of the external operation.

Screw-Worms in the Nose and Nasal Accessory Sinuses. Huber and Flack¹ report an unusual case of screw-worms in the nose and nasal accessory sinuses.

J. M., a farmer, aged 66, was referred to Huber and Flack Oct. 5, 1914, for hemorrhage of the nose. In August, 1913, the patient's nose began to discharge and became very sore. About this time a traveling medicine man came through his part of the country selling an inhalation powder for treatment of diseases of the nose. The patient purchased a large amount of this medicine for use and to be doubly certain of a cure traveled with the medicine man for several months and took treatment under his directions.

At varying intervals large masses of necrotic material were discharged from the nose. Following this he was relieved. Up until two weeks before seeing Huber and Flack his condition had remained about the same. At this time a fly went into one nostril and came out of the other. Following this trouble he became rapidly worse. On October 2, he felt something moving in his nose and called a physician who saw him several times and gave him treatment. This was of but little benefit. Finally the physician injected chloroform and removed seventy-two Texas screw-worms. The patient's condition remained serious and he was brought to the hospital for treatment. At this time a Wassermann test was made which was strongly positive.

Under general anesthesia the following conditions

(1) Jour. Amer. Med. Ass'n., Dec. 26, 1914.

were discovered: The walls of the right antrum of Highmore were completely necrosed and the antrum filled with worms. The middle turbinate on the right side was markedly necrosed. The right frontal sinus was open, and the right ethmoidal cells exposed. The walls of the antrum on the left side were partly necrosed. The turbinate on this side was partly necrosed and the ethmoidal cells exposed. The right eye was swollen shut and a worm was found in the lachrymal sac. These worms were the ordinary Texas screw-worms measuring about one inch in length and about one-eighth inch in diameter. Forty were removed at the operation. On the right antrum a Cadwell-Luc operation was performed. On the left antrum a Denker operation was done. The Ballenger turbino-ethmoidectomy was performed on both sides. The right frontal sinus was curetted. The right canaliculus was split and the lachrymal duct probed. All sinuses were packed with iodoform gauze, after a thorough irrigation with a 10 per cent. solution of chloroform.

The after-treatment consisted in blowing iodoform into the nose and sinuses for one week and a vigorous course of anti-syphilitic treatment. After a week the man was in a much improved condition and left the hospital.

This patient had a long-standing specific necrosis of the bones of the nose and accessory sinuses which undoubtedly attracted the fly carrying the larvæ and furnished favorable conditions for their growth and reproduction.

Oct. 27, 1914, the patient was cured of the worms and the nose looked perfectly healthy except for the damage done by the specific necrosis previously.

Roentgenology of the Nasal Sinuses. M. J. Hubeny² gives the Roentgenologist's view of this subject. He says that the most frequent diseases of the accessory nasal cavities are characterized by inflammation of their mucous membranes.

The inflammatory products, either mucus or pus, also the swelling and polypoid degeneration of the mucous membrane, fill the cavities to a lesser or greater

(2) Read before Wilmette Physicians' Club, March, 1914.

extent. The presence, nature and extent of the disease can be demonstrated by the use of the Roentgen ray.

A polypoid condition is suggested by a mottled appearance; a thickened or inflamed mucous membrane presents a uniform shadow; while a chronic and suppurating process of a sinus is characterized by sclerosis of the bone and obliteration of the cavity by new bone formation.

In diseases accompanied by a purulent or mucous discharge it is advisable to take the head in the horizontal and vertical planes, to see the change in the level of the retained discharge, for the position is influenced by gravity.

Cases presenting vague symptoms of sinus involvement should be examined Roentgenographically. By such an examination one can determine: (1) The shape and position of the different sinuses; (2) absence or presence of rudimentary pneumatic cavities; (3) asymmetry of cells; (4) presence of intercellular septa, showing their depth or height and their probable interference with drainage; (5) anomalous size or position of cells. (a) bulla ethmoidalis, (b) bulla frontalis or supra-orbital ethmoid, (c) extension of sphenoids into the clinoid processes or the greater or lesser wings, (d) hollow septa; (6) unicellular or multicellular involvement.

A complete examination is justifiable in most cases and should consist of (1) lateral view, preferably stereoscopic, (2) postero-anterior, (3) two obliques. To these might be added in exceptional cases, an antero-posterior and a vertical.

When expense is an item to be considered, one postero-anterior and one lateral view will give the most information.

To obtain a postero-anterior view the patient is placed prone with forehead and nose firmly pressed on the plate, so as to include the frontal and maxillary sinuses. The tube is placed about twenty inches from the plate and located so that the central beams pass through the median line and in a postero-anterior plane which extends from the base of the nose through the external auditory meatus.

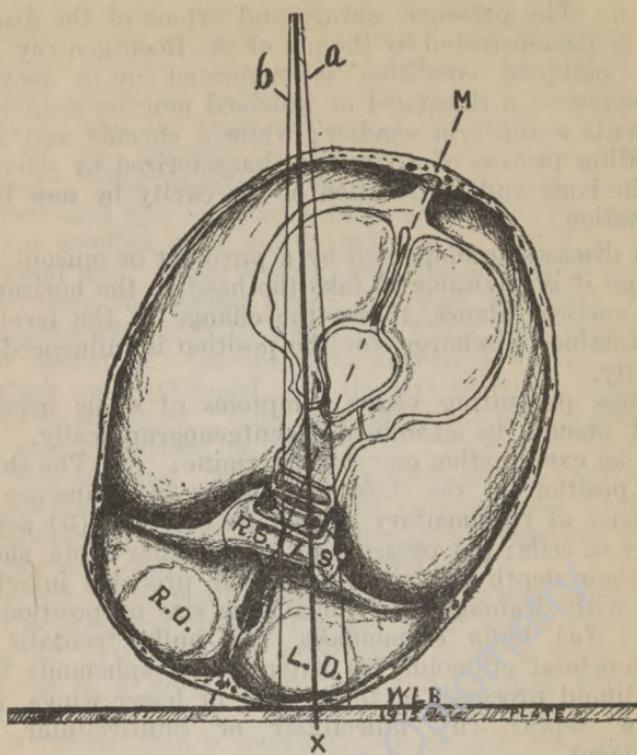


Fig. 39.—Diagram showing projection of sphenoids when the oblique method is used. This shows the left sphenoid projected through the left orbit. A similar view is taken of the opposite side for comparison.

x , is the central ray.
 A and B, divergent rays.
 L. S., is the left sphenoid.
 R. S., is the right sphenoid.
 L. O., is the left orbit.
 R. O., is the right orbit.

In reading such a negative from above downward, we get:

(1) Frontal bone; (2) frontal sinuses; (3) cribriform plate and few ethmoids; (4) sphenoid; (5) on either side of the sphenoids, one will see the posterior ethmoids, below them the anterior ethmoids; (6) nasal cavity with the middle turbinate bone above and the inferior turbinate bone below; (7) on either side of the

nasal cavities are the maxillary sinuses; (8) projected into these sinuses one sees the shadow of the atlas.

In the lateral view, the tube is located about twenty inches from the plate, so that the central beam will pass through the middle of a line drawn from the external auditory meatus to the external orbital margin and directed perpendicularly to the plate.

Examining this plate postero-anteriorly, one will see: (1) external auditory meatus; (2) temporo-maxillary articulation; (3) zygomatic arch; above these are (4) the sphenoid sinuses; (5) posterior ethmoids; (6) anterior ethmoids; (7) frontal sinuses; (8) orbit, and below (9) maxillary sinus.

In the oblique position (see Fig. 39) both sides should be examined for comparison. The head rests on the superciliary ridge, the nose and malar bone.

The tube is placed about twenty inches from the plate and so adjusted that the central beam will enter the opposite parietal region about two inches posteriorly and one and one-half inches above the external auditory meatus and projected toward the center of the orbit. In viewing this plate the optic foramen will be seen in the center of the orbit, to its outer side will be found the sphenoidal fissure, anterior to the optic foramen is the sphenoidal sinus. Above this will be seen the upper brim of the orbit, and above the orbit the frontal sinuses.

Heretofore, considerable difficulty has been encountered in the determination of sphenoidal sinusitis; however, by the use of the oblique method, the presence of pathologic tissue can be definitely determined in many instances. This method is also applicable in ethmoidal sinusitis in which only one cell on one side is involved.

Tumor formations are portrayed with great accuracy.

HAY FEVER.

Hay Fever and Its Treatment. Hay fever, because of its distressing symptoms and the uncertainty of a cure, attracts much attention, and the editors will devote several pages to its consideration. Numerous excellent articles unfortunately will not be mentioned,

as space will not permit. E. T. Manning³ in his study of hay fever and its treatment by injection of a solution of ragweed pollen, defines hay fever as an exudative catarrh of the conjunctival, nasal and tracheo-bronchial mucous membrane, produced in hypersensitive individuals by the sensitizing and anaphylatoxic action of the pollen of certain plants.

As proofs of the etiologic relation between pollen and hay fever, Manning offers the following:

First, if a few pollen grains from one of certain members of the botanic group *graminaceae*, such as rye, wheat, timothy or foxtail, are inserted into the nostrils of a sufferer from rose cold, a typical attack of the disease is immediately produced. This may be done at any time of the year. Again, if a few grains of pollen from certain members of the botanical group *ambrosia*, such as ragweed, golden-rod, asters, or marigold, are put into the nostrils of a patient subject to autumnal catarrh, an attack of the disease follows, even though the experiment be made in winter. Also, the action is specific, that is, pollen from *graminaceae* will have no action on the autumnal catarrh man, and *vice versa*.

Second, and most conclusive proof, according to Manning, it has been established experimentally that guinea-pigs can be readily sensitized to pollen protein by minute doses gradually increased, and, after a suitable incubation period, suffer a most severe anaphylactic shock on re-injection. Guinea-pigs were injected with serum from the blood of a patient suffering from autumnal catarrh and later re-injected with a solution of 1 to 10,000 ragweed pollen, and a typical anaphylactic reaction resulted, thus proving that the guinea-pigs had been sensitized to pollen protein by that contained in the patient's serum. Control animals were not affected by the same dose of pollen protein.

Manning believes, therefore, that pollen from certain plants acts as a causative agent in at least a large majority of cases of hay fever. It has been found by experiment that of the members of the botanic group *ambrosia* which produce this specific reaction the pollen from the ragweed is the most characteristic and repre-

(3) Jour. Amer. Med. Ass'n., Feb. 20, 1915.

sentative. Consequently, ragweed is used exclusively to produce immunity reactions.

Manning quotes Koessler⁴ as giving the best explanation of the action of pollen in hay fever the substance of which follows: It has been known for some time that the bactericidal power of the nasal secretion is due to proteolytic enzymes. It is, of course, accepted that the pollen protein, at some season of the year, reaches the nasal mucous membrane of all persons. In most people the proteolytic enzyme present gradually splits the pollen, like any other foreign protein, into harmless products, proteoses and amino-acids. This cleavage occurs slowly, so that the poisonous group contained in every protein molecule is at any one time only in small concentration and is rendered inert, since the diffusibility is low. Thus, under normal conditions, the absorption of protein is exceedingly minute. However, there are certain conditions which interfere with the normal digestive function of the nasal mucosa, and in that case sufficient protein may be absorbed to lead to sensitization. One such condition may be a lessened nasal secretion associated with a lowered quantity of proteolytic ferment; or another may be a stenosis of the nasal canals through hypertrophied turbinates, leading to excessive accumulation of inhaled matter. It is conceivable that there may be a number of conditions which interfere with the normal nasal secretion. Whatever the cause of the disturbance of the power of the nasal secretion to break up complex protein molecules, the important fact is that, owing to this deficiency, there occurs a parenteral intake of foreign protein. This has the effect of injuring the epithelial cells of the mucosa and the endothelial cells of the capillaries in such a way that the mucosa remains permanently in a state of increased permeability for the protein; also, and most important, it brings about a new function of these cells, consisting of the production of a specific protective ferment directed against the specific pollen protein—in other words, the local tissue becomes sensitized. This at first local sensitization gradually reaches every tissue

(4) *Therapeusis of Internal Disease*, vol. 5, p. 671.
Appleton & Co., 1914.

in the body, and all fixed tissue cells become sensitized; which is only another way of expressing the fact that all cells attempt to protect themselves by throwing off this specific proteolytic enzyme. The tissues first injured, however, retain this specific protective power in the highest degree. Thus these cells remain permanently in a state of sensitization, and when the protein again comes in contact with the sensitized area during the following season, the protein is absorbed unchanged and broken up in the body. The effects of this process depend on the degree of concentration and quantity of the poisonous fraction split off. The first symptoms are obviously local—there occur sneezing, itching and burning in the nose, eyes and throat, followed by vasodilation extending to inflammation with continued absorption. It may readily be seen how, if the process advances far enough, the bronchial mucosa may be affected, either directly or possibly through the blood, thus producing the dreaded asthma.

Therapy: Manning follows the technique of Koessler with some slight modifications: Ten milligrammes of pollen from each variety are triturated with sterile silicon in an agate mortar. Twenty cubic centimeters of a sterile salt solution ten times stronger than a physiologic solution are then gradually added and thoroughly shaken. The suspension is placed in the incubator for twenty-four hours and again shaken. The mixture is then centrifuged at a high rate of speed and the supernatant fluid pipetted off. This solution is a dilution of 1 to 1000, and from it all others are prepared. First, it is diluted ten times with sterile distilled water to which has been added .25 per cent. phenol (carbolic acid). The salt solution is then a physiologic one, and is a dilution of 1 to 10,000. This dilution and all lower ones are unstable, and deteriorate by progressive proteolysis into a toxic product within ten days. The concentrated 1 to 1000 solution is more stable and will keep on ice for about three weeks. All manipulations must be carried on with aseptic precautions.

The unit of pollen toxin adopted by Manning is the amount of protein contained in 1 1,000,000 gm. pollen, or that contained in 1 c.c. of a dilution of 1 1,000,000.

Results: Twenty-one cases were tested: fourteen patients were objectively and subjectly relieved; in the other seven the treatment was incomplete for one reason or another. Two of these seven showed no reaction, either good or bad. Four more were certain that their attacks were lighter. One patient was undoubtedly made worse, a result which Manning thinks was due entirely to a mistake of judgment in giving a large dose without gradually working up to it. Three of the patients had a bad complicating asthma. Two of these were completely under control and the other was much relieved. In each case in which a positive result was obtained, after a dose was given sufficiently large to obtain relief, the freedom from symptoms lasted from two to five days, depending on the severity of the case. Then the symptoms returned, although they usually were not so severe. Another dose of the same size being then given, relief was again obtained. The immunity conferred was only of a transitory nature.

Manning warns that much harm may result from the treatment unless certain precautions are taken, namely: the solutions must be sterile, they must be fresh, and they must be, so far as humanly possible, of uniform potency.

Active Immunization of Hay Fever. Oppenheimer and Gottlieb⁵ endeavored to immunize patients by injecting gradually increased doses of pollen extract to produce tolerance to the anaphylotoxin formed in the body. Beginning with from 1 to 5 units of pollen extract, the dose was gradually increased as before. One unit of pollen toxin is the amount of antigen dissolved in 1 c.c of extract at a dilution of from 1 to 20 millions. Eleven patients were treated in 1914 before and during the season for autumnal catarrh. Six patients were treated in advance of the attack. One of these was cured for the season, four exhibited very mild symptoms, and one was not improved. Five were treated during the attack. The symptoms in four subsided after receiving from one to four injections, whereas one patient received no benefit. Altogether there were five cures for the season.

(5) New York Med. Jour., Feb. 6, 1915.

In four patients there was marked improvement, in two there was no improvement.

Of the two who were not improved, one patient had a polypoidal degeneration of the middle turbinate with underlying bone necrosis. The other reacted to both ragweed and golden rod pollen. He received in all thirty-three injections, alternating the ragweed extract and the golden rod extract. It is possible that at times the treatment was too intensive. His physical condition was so poor that possibly a tolerance could not develop. Nine patients reacted to ragweed pollen and two reacted to that of both ragweed and golden rod. Both of these received both golden rod and ragweed antigen hypodermically. One was cured, but the other was not improved.

Anaphylactic Skin Reactions Excited in Hay Fever Subjects by Pollen of Various Species of Plants. Fifty-eight cases giving a history of hay fever were examined by J. L. Goodale.⁷ The extracts were prepared by soaking the pure pollen for twenty-four hours in 15 per cent. solution of alcohol and filtering. Forty-five patients were examined with reference to grasses. It was observed that in all positive cases the red-top, timothy and blue grass equally excited reactions. Of these patients eight were affected by grass alone, none of the other plants tested exciting reaction. Thirteen were affected both by grasses and ragweed alone. Six showed positive reactions toward grasses, ragweed and golden rod, and a variety of other plants. Three showed positive reactions to grasses and roses alone. The beach grass was tested in twenty-seven patients. This, although flowering late in the season, excited positive reactions in eleven individuals with the spring form, fifteen being doubtful or negative.

Ragweed was tested in forty-nine patients; of these forty-five were positive, four being negative. Thirteen patients were affected by ragweed alone, no other plants tested exciting reaction. Sixteen were positive with reference both to ragweed and to golden rod, but not to other plants. One patient showed positive reaction to grasses, ragweed and roses, but not to golden rod or

to other plants. Forty-nine in all were tested for golden rod. Of these twenty-six were positive, twenty-three being negative. One patient only showed positive reaction to golden rod alone, without disturbance from other plants, in all of the other positive golden rod cases the patients reacted also to ragweed.

Twenty individuals were tested for yarrow, five being positive, fifteen doubtful or negative. Beach wormwood was tested in six patients two of them showing moderate reaction, four being negative. Field daisy was tested in fourteen cases, five of them showing a moderate reaction, nine being doubtful or negative. Burdock and fall dandelion were tested in three cases, showing each one positive and two negative results. Hawkweed was examined in seventeen cases, five being positive and twelve negative. English daisy (*Bellis perennis*) was examined in twenty cases, four being positive and sixteen negative. Pigweed was examined in twenty-six cases. Three of these were positive, and twenty-three were negative. Wild carrot, or Queen Anne's lace, was examined in twenty-three cases, only one being positive and twenty-two negative. Tansy was examined in twelve cases, two being positive and ten negative. Two types of roses were tested, the early flowering Japanese rose and the late flowering prairie rose. The Japanese rose was examined in nineteen cases, three being positive, the remainder without reaction. The prairie rose was tested in eight cases with negative results. The mock orange was tested in six cases, two of these being positive.

Specific Treatment of Hay Fever by Active Immunization. In the last four years Koessler⁸ has treated forty-one hay-fever patients by active immunization with pollen extracts. Five of these began treatment after the disease was already developed. The remaining thirty-six had autumnal catarrh. Seventeen of these patients had prophylactic treatment, nineteen were treated while symptoms of hay fever were present. Four of these patients have been completely free from hay fever, though remaining in their usual place of abode. Of these four patients, three had treatment dur-

ing two years, and one during three years for from two to three months. The supreme test in patients who are apparently free from the disease, is a railway or an automobile journey through flowering fields. Only these four patients of the forty-one could stand this experiment; two of them have so far remained free for two years and two for one year. Of the other thirty-seven patients, twenty-nine were markedly improved. The remaining eight are considered not improved. The marked improvement consists in later, milder and shorter attacks, in the possibility of remaining in town and at work for the first time in years, in a diminution or disappearance of troublesome cough and constitutional symptoms. Twenty-three of the forty-one patients had previous asthmatic attacks during the day and night in the critical season. Of these sixteen experienced an undoubted amelioration of this most distressing feature of the disease. Six of these hay-fever asthmatics had no asthmatic symptoms, though five of them still retained other symptoms of hay fever. Others had only two or three attacks during the whole season, were little disturbed in their sleep during the night, while emphasizing the improvement experienced.

RHINITIS.

Common Colds. N. P. Stauffer¹⁰ divides rhinitis into three stages:

1. Dryness or prickling of nose and throat accompanied by chilliness. The mucosae are quite hyperemic, dry and free from secretions; headache with fulness between the eyes. The temperature ranges from 99 to 104 F. Treatment comprises hot baths, purges (calomel and salts; salts especially to deplete the system of water); rest in bed; ice bag to forehead; hot water bag to feet; internally, 10-grain Dover's powder and hot lemonade to promote sweating; in the nose, locally, epinephrine 1 to 5000.

2. Profuse watery discharge, throat sore, headache

(10) New York Med. Jour., March 21, 1914.

less. Treatment: Atropine internally until dryness of nose and throat develops; hot alkaline nasal douches; hydrochloride of cocaine daily, 1 per cent. solution applied. (Caution.—Never prescribe cocaine for a patient to use at home). When using cocaine always have aromatic spirits of ammonia handy.

3. Muco-purulent discharge, a lowered temperature, pulse less bounding, headache diminishing unless sinus uses are involved, whereupon headache and pressure symptoms increase, accompanied by dizziness. Treatment: Hot alkaline nasal douches, hydrochloride of cocaine to nares, oil sprays, strychnine sulphate, 1/100 grain three times a day, egg and milk, increased exercise, alcohol rubs twice daily; hexamethylenamine 5 grains, internally three times a day. This deals with the common cold up to the involvement of the sinuses.

Cauterization of Mucous Membrane. The editors as well as E. de W. Wales¹ protest against the cauterization of the mucous membranes, particularly of the nasal mucosa for the reason that pathologic conditions of the nose are caused by cauterization. As drinking caustic fluids generally causes death, so application of caustics to the nasal mucosa often destroys the function of the nose.

No therapy should be used in the nose that burns or irritates the uncocainized nasal mucosa, because such treatment causes chronic rhinitis.

Cauterization is a method of getting results without thought of final consequences. It is irrational and lessens the efficiency of the nose by destroying the integrity of the ciliated columnar epithelium, leaving in its place tissue which can not carry on a single function of the nose.

RHINOSCLEROMA.

L. G. Kaempfer² defines rhinoscleroma as a chronic infective granuloma of very slow growth, characterized by the production of nodular thickenings in the skin of the nose or in the mucous membrane of the nose,

(1) Ann. Otol., Rhinol. and Laryngol., September, 1914.

(2) New York Med. Jour., March, 1914.

pharynx, or trachea. While these are the usual sites of the lesions, they may extend even into the smallest bronchi, as almost any part of the body may be affected. The disease, though it apparently thrives in all parts of the world and under varying climatic conditions, is rarely seen in this country. Kaempfer cites seven cases from the literature reported since 1908, most of them in Russians and all in early adult life.

Pathology. At first the nodules are smooth, red in color and soft. They soon become shrunken, harder, and pale or grayish white. Their centers become depressed, and the whole surface of the growth has a characteristic shiny, crinkly appearance. The nodules are usually sessile, though they may have narrow pedicles and resemble ordinary mucous polypi. In the nose they may become quite large and cause marked deformity. In the pharynx stenoses by virtue of the size of the growth, or from cicatricial contracture are seen and may cause serious interference with breathing and swallowing. The mouth and tongue are rare sites for the lesion. Nodules have been found as far down as the bronchi of the second and third dimension. The growths consist of new formed granulation tissue with old and new fibrous tissue and very many small round oval cells. Besides these, there are in the deeper parts of the masses the characteristic cells of the lesion, the Mikulicz or foam cells. These are several times larger than the other cells, and either round or irregular in outline. The cell bodies in some are granular, but usually the protoplasm appears gelatinous. The nuclei are paler than in the smaller cells and are pushed to one side. Hyaline masses, the "Russel bodies" are also found in the deeper parts of the lesion. In sections of tissue stained according to Gram, there can be seen, in the Mikulicz cells and in the lymph spaces surrounding them, the small, oval, capsulated diplobacilli described first by Frisch, in 1882. These do not retain the stain and resemble morphologically and culturally the diplobacilli of Friedlander. They are almost always found in pure culture.

Symptoms. The disease seems to have no effect on the general health of the patients nor does it predispose

to other diseases, except such as are favored by catarrhal conditions of the mucous membrane of the upper air passages. The local symptoms are those due to mechanical obstruction by the growth; obstruction of the nose, difficulty in breathing, pain or difficulty in swallowing, hoarseness or dyspnea, either constant or on exertion. When rhinoscleroma involves the nasopharynx in the vicinity of the Eustachian orifices, deafness, ear pains, or tinnitus may obtain.

Prognosis. The disease has been said to be incurable, though lately some observers have reported cases cured by the *x-ray*. Whether or not the cures are permanent is not known.

Diagnosis. The diagnosis depends upon the presence in a granuloma, of the Mikulicz cells containing Gram-negative diplobacilli in pure or in almost pure culture, in the depths of the lesion. The chronicity of the lesion, its appearance, and its bilateral character in the nose, together with the pathologic findings are enough to establish a diagnosis.

Therapy. Drugs, internally, or locally as caustics, have proved ineffectual. Surgical intervention removes the growths, but does not prevent their recurrence. Vaccine therapy has been tried with very little success. At present, the use of the Roentgen ray yields the best results.

More recently salvarsan has been tried, but without much success.

Kaempfer concludes:

1. One would say that at the present time the cause of the disease is as far from elucidation as it ever was, and that the Frisch bacillus is present as a secondary invasion.

2. Many more cases would undoubtedly be reported in American literature if the existence of this condition were kept in mind in the diagnosis of doubtful appearing nasal growths.

3. The best present therapeutic agents are the *x-ray* and radium.

4. As for salvarsan, there have been too few cases reported to form the basis of an opinion, but it seems that it is not effectual.

NASAL DISEASE AND TUBERCULOSIS.

Obstructed Nasal Breathing and Tuberculosis.
Wotzilka³ gives the results of his investigations as to whether nasal affections are commoner among persons with pulmonary tuberculosis than in others. Examination of sixty-seven tuberculous men and thirty-three tuberculous women showed that forty-five were unable to breathe normally through the nose, while among forty-eight non-tuberculous men and fifty-two non-tuberculous women only thirteen of the 100 were unable to breathe normally. This preponderance of 45 per cent., over 13 per cent. among the non-tuberculous is certainly a striking coincidence. The causes of the obstruction were deviation of the septum, hyperplasia in nose or throat, ozena or rhinitis with atrophy. Wotzilka believes that care to keep the nasal passages and the throat normally permeable may prove important in prophylaxis of pulmonary tuberculosis and may aid in recovery. Especially in the incipient stages every effort must be made to promote the respiration in every way.

EPISTAXIS.

Nosebleed in Children. A. Petry⁴ reports a case of a girl, aged 9, who for a year had suffered from recurring epistaxis and was extremely anemic. She had been treated with iron for the anemia, but the nosebleed kept returning. Petry discovered two minute ulcers on the septum, the source of the bleeding, and as soon as these had been cauterized with trichloracetic acid there was no further hemorrhage and the anemia rapidly gave place to normal conditions. During sepsis and acute infectious diseases, Petry recommends that the diagnosis of "septic nosebleed" should not be made without inspection of the nose, as an overlooked bleeding ulceration may do great harm. In one of Petry's cases a child of 7 had pneumonia, fever, headache and vomiting, and by the end of a week began to vomit large amounts of dark clotted blood and was much agitated.

(3) Med. Klinik, May 31, 1914.

(4) Berlin. klin. Wochenschr., Nov. 30, 1914.

No one, not even the trained nurse, suspected that the blood came from the nose until a small bleeding ulcer was found on the septum and promptly healed under an epinephrine salve. In two other cases pneumonia set in with profuse epistaxis, and necropsy in one case showed numerous emboli of diplo-staphylococci in the capillaries of the nasal mucosa. The mucosa in the non-fatal case presented the same aspect. In a third case, the profuse epistaxis came on likewise late in the course of pneumonia, and the nosebleed was followed by extravasation of blood into the skin at various points. The child had tossed around so much that the ecchymoses at various points were evidently of a traumatic nature, but the hemorrhages were none of them profuse enough to have proved fatal if it had not been for the continuous drain from the bleeding ulcer on both sides of the septum. It is more than probable, Petry adds, that the child might have been saved if the bleeding ulcers in the nose had been discovered earlier.

RHINOSPORIDIUM KINEALYI.

Occurrence and Development of Parasite. T. S. Tirumurti⁵ says that the name *rhinosporidium* is a misnomer, because the parasite is found in other situations than the nose, though the nasal mucous membrane is its favorite site. The occurrence of the sporozoön in the conjunctival and nasal mucous membrane is explained by direct inoculation through infected clothing, handkerchiefs, or the hands. The spores are discharged in the nasal secretion, which is rather profuse in patients who suffer from this parasitic polypus in the nose, and who are subject to chronic nasal catarrh and profuse bleedings from the nose.

The growth of the parasite being usually one of long duration, the source of the infection is forgotten and a history of close contact is not easily elicited. The preponderance of the parasitic cysts in large numbers, mainly in the epithelial and subepithelial tissues, is also suggestive of this mode of conveyance of the disease by infected nasal secretion. The occurrence of the parasite

in the penis in a man who was otherwise healthy and showed perfectly normal appearances of the conjunctiva and nasal mucous membrane, is very suggestive of direct inoculation through sexual congress.

Tirumurti suggests that rhinosporidial polypi do occur in the mucous membrane of the mouth, anus and vagina, but are overlooked, microscopic examination not being conducted in every case. The growths have a great tendency to recur, though Tirumurti believes that thorough cauterization may prevent a recurrence. The clinical features of the growths are characteristic, though modified according to the site of their occurrence. The recurrence and innumerable number of cysts of the parasite, in different stages of development in a small fragment of the tissue affected, are in favor of the sporozoön undergoing its complete cycle of development in the human body without the intervention of an intermediary host.

OCCLUSION OF NASAL CHOANAE.

Report of Case. A. O. Pfingst⁶ reports a case of complete bilateral bony occlusion of both nasal choanae in a telephone operator, aged 24. As long as she could remember the patient had been unable to breathe through her nose and had been unable to blow her nose, but by pressure against the alae, she could remove viscid fluid from the nasal passages. Her sense of smell, since she had been able to compare it to the perception of others, had not been well-developed. Her hearing apparently had always been normal.

Examination revealed nothing abnormal in her condition. There was nothing unusual about her facial expression—except the open mouth. A probe passed through either meatus met with an obstruction far back, which on examination was found to be due to a hard, firm partition apparently closing the entire passage. The middle of each partition was marked by a slight depression. Post-rhinoscopic examination revealed a septum completely closing the lumina of both choanae. It seemed slightly convex and appeared to have a general

direction downward and forward. It was placed just inside of the choanae. The margins of the choanae were well-defined and the vomer projected slightly beyond the septum in the median line. To the finger the septum gave the impression of being bony. The palatine arch was about normal. There was no retraction of the drums. Hearing for watch and voice was normal.

DACYROCYSTITIS.

Intranasal Operation for Cure of Dacryocystitis.

After failure to relieve dacryocystitis by the usual and rational method of slitting the lower canaliculis, and the use of probes of increasing size to overcome the stricture condition of the nasal duct, F. M. Hanger^s advises that an intranasal operation be tried. He gives a method:

First, a few drops of equal parts of a 20 per cent. solution of cocaine muriate and adrenaline chloride 1 to 1000 are injected into the lachrymal sac. There is no danger of the solution entering the nose because of the stricture usually found just below the sac. Then, a small lachrymal probe so moistened that pulverized cocaine will adhere to it is passed into the sac and the cocaine worked down in the nasal duct as far as the stricture. In a few minutes the whole canal will be so anesthetized that larger and larger probes can be passed into the nose until Theobold's No. 13 can be passed without pain.

The probe is left *in situ* and is the guide during the operation within the nose. The inferior turbinate and the site over the nasal duct are then rapidly and thoroughly cocainized and adrenalinized with a cotton swab, special care being given to the under-surface of the inferior turbinate. Then the front attachment of the inferior turbinate is covered with Struycken's nasal forceps and about one-third of the bone cut away with a small Hartman tonsil punch. The lower end of the probe is then seen at the lower meatus.

As the lower front part of the bony nasal duct is thick and hard it may be necessary, but not always, to cut this away with a curved or angled chisel or gouge, in order to use to advantage the curved right-angled punch-forceps with which the operation is rapidly completed. It is best for an assistant to hold the speculum when the chisel is being used, a Myles speculum being the best. The lachrymal probe or guide is then slowly withdrawn upward, while the male blade of the punch forceps follows in its wake and bites away, at several bites, the inner wall of the nasal duct up beyond the stricture; thus converting it into an open gutter and the operation is finished.

It is well to pack the nose with a strip of gauze, for twenty-four hours, to restrain hemorrhage and to irrigate the lachrymal sac for a few days. Water should pass easily into the nose and drainage of tears should be perfect in a week's time, if not sooner.

Dacryocysto-Rhinostomy. In former years the treatment of suppurative dacryocystitis consisted in the removal of the afflicted lachrymal sac. The operation was exclusively performed by the ophthalmologist, as the diseased structure was considered to be an appendix of the eye. Due to the pioneer work of Onodi and others, opinion as to the topographic and operative anatomy of the lachrymal sac has undergone a radical change. Otto Glogau⁹ says: Modern rhinology considers the lachrymal sac a nasal accessory cavity that empties into and should therefore be attacked through the nose. Besides avoiding the disfiguring scar of the old, external method, the intranasal route is the more logical procedure. The removal of the sac obliterates forever the channel through which the tears should drain into the nose and the annoying symptoms of epiphora persist even to a greater degree. Besides, in most instances the suppuration is due to a primary constriction below and to a consequent stagnation and infection of the fluid within the sac.

In order to prevent any possibility of obliteration of the new opening and to save the patient from the annoy-

ing probing during the after-treatment, Glogau presents the following modification of Halle's method:

The nasal wall is cocainized (20 per cent.) and adrenalinized. Through the previously slit canaliculus the sac is first washed out with an antiseptic solution and then cocainized. A lachrymal probe is then introduced. At the anterior attachment of the middle turbinate the bone together with its lining of mucous membrane is chiseled away until a hole of about 3 mm. diameter is formed and until the chisel strikes the probe that is pushed by the assistant toward the nasal cavity.

A piece of the inner wall of the sac is then excised according to the method of West and Halle. A thin probe with an eyelet at one end is introduced with its blunt-pointed end, until it can be seen emerging from the opening of the sac into the nasal cavity. Into the eyelet at the upper end of the probe No. 2 white silk has been threaded.

Under guidance of the reflected light the blunt-pointed end of the probe is then caught by means of a nasal forceps and the entire probe pulled off the nose. The end of the silk thread thus emerging from the nose is then tied to its other end at the canaliculus. No external dressing is needed. Glogau says that the entire operation ought not to take longer than a few minutes. This silk drain remains in place for several weeks until there is no more possibility of closure of the wound. The patient is not annoyed by the thread. By means of a piece of cotton a 10 per cent. solution of protargol is applied to the thread and the latter moved up and down, whereby the medicament is brought into intimate contact with the entire naso-lachrymal duct. The patient quickly learns the simple procedure and applies it at home.

SYPHILIS.

Latent and Tertiary Syphilis in Diseases of the Nose and Throat. C. R. C. Borden¹ says that tertiary lesions in the nose and throat require early diagnosis for two

(1) Jour. Amer. Med. Ass'n., Oct. 31, 1914.

highly important reasons: first, because their presence demonstrates an active syphilitic process in functionally important organs, and, secondly, because the general systemic infection causing localized symptoms in the nose or throat may later develop still more serious lesions in the central nervous or arterial systems.

Latent syphilis is a particularly important matter in nose and throat practice inasmuch as operations in that field may rapidly change the latent disease into a very active one. To operate on a patient with latent syphilis without knowledge of its presence is a serious error and one which should be guarded against. Borden strongly believes that one has no moral or legal right to perform a destructive operation of any magnitude on the nose or throat until a Wassermann test has been made.

The value of the Wassermann reaction depends on the period of the disease at which it is taken. It has no value in the primary stage. As soon as the disease manifests itself in the general system, it develops its full strength. The effect of previous treatment with mercury is to give a negative Wassermann reaction; hence, a negative test is not positive evidence that syphilis is not present. The effects of previous treatment, moreover, may extend over a period of years and give a negative test in the tertiary period. The situation is still further complicated because in the latter stage of the disease lesions in bony tissue have a strong tendency to yield a negative Wassermann test even in untreated individuals. This is an important point in tertiary lesions of the nose inasmuch as such lesions usually occur in the bony tissue. The Noguchi test is practically the same as the Wassermann. On the other hand, the luetin test is occasionally positive when the Wassermann test is negative. In such an event the result of the luetin test may be given the preference.

Salvarsau alone is not to be relied on. Mercury must be used in conjunction with it over a long period of time.

DISEASES OF THE THROAT.

MOUTH.

Pyorrhea Alveolaris. Bass and Johns¹ have examined more than 200 cases of pyorrhea alveolaris in all stages of the disease, and have found amebas present in all except one case. They believe the conclusion is justified by their investigations that amebas, chiefly if not wholly of the species *Entameba buccalis*, are demonstrable by proper technique, in the lesions of pyorrhea alveolaris in all stages of the disease, in all who have the disease in their locality (New Orleans). They mention that these lesions are the early lesions or the beginning of the disease, which later reaches the alveolar process, and finally, by destruction of the periodental membrane, leads to the loss of the teeth, and is then called pyorrhea alveolaris. What is now generally recognized as pyorrhea alveolaris, or Rigg's disease, is, therefore, in fact, the late stage of a disease which would more correctly be called periostitis dentalis.

Bass and Johns have found that amebas are not demonstrable in more than from about 2 to 5 per cent. of all cases after $\frac{1}{2}$ grain emetine hydrochloride, given hypodermatically each day for three successive days. Demonstrable amebas disappear in only a small percentage of cases from one dose of emetine. They do not disappear, in most cases, if the interval between doses is more than twenty-four hours. In about 12 or 15 per cent. of cases in which amebas could not be demonstrated just after the course of emetine, they have been found again in one or more lesions from a few days to five weeks after the emetine treatment had been given. In a few instances this was observed also in the case of patients who had applied fluid extract of ipecac when brushing the teeth, which, theoretically at least, would tend to prevent re-infection. Bass and Johns recommend that the emetine treatment be continued daily for a period of from three to about six days, according to the extent of the disease in the particular case. Wash-

(1) New Orleans Med. and Surg. Jour., February, 1915.

ing the large deep pockets with emetine, 0.5 per cent. solution, or, probably better, with a 1 to 1000 solution of fluid extract of ipecac, would help to disinfect them of their amebas.

Inflammation of the Mucosa of the Mouth. F. Williger² says that when there is damage from a broken tooth or general febrile disease, the secondary stomatitis that may develop is depressing and measures to cure it are imperatively needed and give great relief. Not only the teeth, but the gums and tongue must be wiped off with the finger wrapped in a thin layer of cotton. The best way, he says, is to cut a piece about 4 by 10 cm. out of sheet cotton and then peel off a very thin layer to wrap around the finger, and dip the finger in a mouth wash. By using plenty of fluid the mouth can be thoroughly cleansed without hurting. The patient can do this himself when perseveringly trained until he does it right. Three times a day is as often as it should be done; the mouth should be rinsed out after eating. With contagious diseases a wad of cotton held with forceps must be used instead of the finger. The mouth wash must be such as rapidly softens phlegm and thick coatings, and nothing seems to be better for this, he says, than a heaping teaspoonful of sodium bicarbonate stirred into a glass of warm water, supplemented by hydrogen dioxide, not more than a teaspoonful of the latter to a glass of warm water. Medicated chewing gum also promotes the natural self-cleansing of the mouth. Williger emphasizes that before beginning mercurial treatment the teeth should be put in good order and all tartar removed.

Ulcerative stomatitis he treats by swabbing with undiluted hydrogen dioxide, repeating this until the fetor has disappeared. The tartar is then removed, not too forcibly, and then the ulcerations are swabbed and rubbed quickly with an 8 per cent. solution of zinc chloride. The patient rinses the mouth every hour with the warm, weak hydrogen dioxide solution, and cleans out the mouth three times a day with the cotton-wrapped finger. Then the rest of the tartar is removed and by the third day the ulcers are healing and by the end of

a week the cure is complete. Instead of the zinc chloride, a mixture may be used consisting of a little iodoform and a few drops of alcohol with enough of an 80 per cent. solution of lactic acid to make a thin paste. The tooth brush hitherto used must be burned. Aphthous stomatitis requires just the reverse—avoidance of every irritating substance and merely warm sodium bicarbonate or boric acid solutions held in the mouth for five minutes; the mouth is thus rinsed out six times a day. The aphtha can be touched with 3 per cent. boric-acid glycerine solution. Drug stomatitis may range from simple edema to blisters and necrotic patches. It requires mild treatment.

Pemphigus of the Mouth and Throat. Robert Sonnenschein³ reports two cases of pemphigus involving primarily the mouth and throat.

Pemphigus on the mucous membranes shows not intact vesicles, but ragged, gray white, macerated membranes, smooth, red or granulating erosions. There may be thickening of such structures as the epiglottis, true or false cords or, at times, ulcerations which later produce scars and distortions.

The pemphigus lesions may be located anywhere in the mouth and upper respiratory tract without any special predilection. As a rule, however, the process spreads from the mouth downward into the pharynx, larynx, or even trachea and bronchi. If the pemphigus on the mucosa is extensive, very unpleasant and at times agonizing symptoms arise such as pains, difficulty in swallowing, salivation, fetor, etc. The general symptoms vary greatly, but may show itching, disturbance of appetite, occasional edema, profuse diarrhea, later cachexia, and death. The latter is sometimes due to some intercurrent disease.

Both of the cases cited began in the mouth, one case showing more intense and more diffuse lesions extending from the lips into the trachea, and probably into the gastro-intestinal tract. In this case there was a distinct history of nervous exhaustion, nephritis and phlebitis following pregnancy two and one-half years previously.

Both patients died within about six months after the first lesion appeared in the mouth.

Dr. Sonnenschein reaches the following conclusions:

1. Acute pemphigus is of rather unusual occurrence.
2. The early appearance of lesions in the mouth and throat gives an exceedingly poor prognosis.
3. Treatment is of little avail in either acute or chronic cases, in the former the patients usually dying within a comparatively few months.
4. In the differential diagnosis quite a number of commonly seen diseases must be considered—lues, herpes, diphtheria, etc.

Sarcoma of the Tongue. A diagnosis of sarcoma in any part of the body seems always to fill the mind of the attending surgeon with a certain foreboding of ill in the prognosis. Rightly or wrongly, there persists for a time at least in the minds of those near the patient the haunting fear that there is more likelihood of recurrence, or of metastasis, than probability of complete and permanent cure after the first surgical intervention.

Search through the literature (English, French and German) has brought to the notice of W. T. Coughlin⁴ fifty-eight reported cases of tongue sarcoma. From a study of these and his own, the following opinions were formulated. [The editors believe the space given to this subject is justified by the fact that Coughlin clears up many disputed points in his excellent and thorough article.—B.]

ETIOLOGY: Age: It is the commonly accepted opinion that all varieties of sarcoma are more common in children, but Coughlin shows this is not true. Adding together those in the first two decades, Coughlin found cases showing up in patients under 20 years, 19.6 per cent. of all.

After adult life is reached the condition is more frequent. Thus in the twenties there were ten reported cases, 19.6 per cent., or just exactly as many as are found in the first two decades put together.

Fourteen cases, or 27.4 per cent. of all acquired cases were found in the thirties.

Between forty and fifty years are only six, 11.7 per

cent., and in the sixties only four are recorded, 7.8 per cent. The oldest patient was 71, and this was the only one found in the eighth decade.

In seven of the cases recorded no mention was made of the age.

The relative known proportion of males to females is 62.2 and 37.7 per cent.

Occupation: This was stated in ten cases. One patient was a pupil in a grammar school and one in a high school; two were medical students; one was a teacher, and the others were of the laboring class.

PATHOLOGY: The location of the growth is stated with fair accuracy in forty cases.

Sarcoma of the tongue seems to have been more common on the right side and toward the base, although no one part of the tongue can be said to be an especially favorite site of the growth.

The sarcoma begins most often in the tongue substance and grows toward the dorsum, soon causing a projection on the upper surface. Here, as elsewhere, it is the rule for sarcoma to infiltrate the muscles lying in its neighborhood, growing between the fibers, which are soon destroyed. It soon traverses the median septum and invades the other side of the tongue. It spreads to the facial pillars and to the floor of the mouth, and when either or both of these become involved the organ becomes fixed, thus rendering the patient unable to protrude the tongue, and increasing the difficulty of swallowing.

The rate of growth varies greatly. In by far the greater number of cases the patient came for relief in less than ten months after the appearance of the growth.

The tumor has been provided with a *pedicle* or stalk in six instances. The *size* of the tumor is mentioned frequently and varies within wide limits. The smallest was only "the size of a large pea." Another was "as large as an orange." The *color* of the mucous membrane covering the tumor as a rule does not vary much from normal. There may be dilated veins over the surface or the mucous membrane may be very thin or there may be abrasions or excoriations which bleed easily when touched.

Generally, the mucous membrane covering the tumor

is smooth, and when the tumor presents on the dorsum of the tongue, the mucosa is always firmly fixed to the growth. When, however, the sarcoma first appears on the under surface of the tongue, it is not unusual to find the mucosa freely movable over it.

Ulceration of the surface is commonly seen, the more so of course in advanced cases or larger growths. It does not often occur on the under surface, and when it does it is usually because the growth presses on the teeth.

In view of the fact that sarcomas found in regions rich in lymphoid tissue often spread through the lymph-stream, and remembering the presence of lymphoid tissue in the tongue, it is important to know the frequency of glandular metastasis in sarcoma of the tongue. Altogether, the question as to gland involvement was answered thirty-seven times.

There were thirteen patients with glandular involvement before operation, and two in whom the glands were found to be involved after operation, a total of fifteen cases out of thirty-seven with undoubtedly glandular metastasis, or 40.5 per cent.

In thirteen cases mention was made of the type of cell in the parent tumor with glandular metastasis, of these, seven were round-cell, 53.8 per cent.; four were spindle-cell, 38.4 per cent., and two were of the mixed-cell type, 7.7 per cent.

There were forty-nine cases in which the type of cell was noted. Of these twenty-two or 38.7 per cent. were round-cell. In only six of them, however, was reference made to the size of the cell, and these were of the small-cell variety.

There were nineteen cases or 38.7 per cent. of the spindle-cell. There were eight cases in which both round and spindle cells were found—mixed cell 16.3 per cent. In one of these in addition cartilage cells were present.

SYMPTOMS: Usually the first symptom noticed by the patient is the feeling as though a foreign body were in or on the tongue. The next is likely to be interference with speech or deglutition. In two instances the patient first sought relief for "sore throat."

Bleeding on mastication was the first sign in two cases. These were both pedunculated growths. Bleeding may occur independently of mastication and may be very severe.

Pain or soreness has been observed very often, pain oftenest. This is usually in the tongue at the site of the growth and may occur only at intervals. It may occur in the presence or absence of ulceration. In the absence of ulceration it may occur at intervals and be of a sharp stabbing character. Soreness does not often occur without ulceration, but when this happens both soreness and pain may become constant. The pain may radiate to the ear of the same side.

It may occur only on attempting to protrude the tongue or on taking food. It is sometimes so severe as entirely to prevent chewing or the swallowing of solids. It has been known to disappear as the tumor grew larger.

Difficult swallowing is a constant symptom when the tumor is in the base of the tongue, but it has also been noted when the growth was anteriorly situated. The dysphagia is not always due to the pain, but the tumor may mechanically interfere with swallowing. This has been seen in growths beginning in the base or root of the tongue, and in those involving the fauces or pharyngeal wall.

Dyspnea is common as a late symptom. It is oftenest found in those cases in which the tumor is situated far back in the tongue. A small growth in the tongue just in front of the epiglottis can early interfere with respiration.

Fetor *ex ore* has been noted twice. In both cases ulceration was present. Inability to close the mouth properly is seen in the case of large tumors. Protrusion of the tongue may be interfered with or totally prevented. This occurs when the growth, spreading through the root of the tongue, involves the floor of the mouth or the fauces and pharyngeal wall.

In many of the cases loss of weight and anemia have been remarked. They have been present in cases without as in those with ulceration of the tumor, but all so affected suffered with dysphagia.

DIAGNOSIS: The condition is a rare one and there is no macroscopic picture on which one may depend. It may be confused with inflammatory lesion or with other new growths. Of the inflammations, chronic interstitial glossitis, tuberculosis, lues, actinomycosis or chronic abscess are the most likely to lead to error.

Tuberculosis is generally seen as an ulcer at the side or tip on the dorsum of the tongue, but it may begin as a small lump or tumor, and if so might lead to the diagnosis of sarcoma. It is, as a rule, found only in those who have well-advanced tuberculosis of the lungs. It ulcerates early. The ulcer shows some tendency in places to heal or granulate, and this a sarcomatous ulcer ordinarily does not do.

The luetic lesions likely to be mistaken for sarcoma are the chancre, the gumma and the diffuse infiltration. The chancre's ulcerated surface, generally raised up on an infiltrated base, reaches its maximum size in a couple of weeks and ceases to grow. The ulcer precedes the tumor. The glandular enlargement occurs early and is usually very marked. Pain is not common nor is soreness. The appearance of secondary symptoms within six weeks is the rule.

A gumma grows rapidly. It is usually near the middle line and pain is absent. A yellowish or grayish spot soon appears in its center; it breaks and discharges a thick mucoid matter. The resulting ulcer is "punched out" or has undermined edges and its floor is covered with a grayish or yellowish membrane. It soon shows signs of healing.

Diffuse infiltration of lues sometimes attacks the tongue. It usually begins in the deeper parts of the tongue and early impairs movement. There is no tumor to be found and the tongue is only slightly increased in size. Pain is not common or severe and ulceration of the surface does not often occur. If the conditions have existed for long the surface of the tongue is bosselated, and painful fissures may develop in the sulci.

Actinomycosis usually presents signs of inflammation from the beginning; abscess formation with resulting sinus is the rule. Then ensues the diffuse and spreading infiltration with further sinus formation. Later, the

granules are seen and the microscope makes the diagnosis easy.

With chronic abscess of the tongue, aspiration might be used to clear up the diagnosis.

Benign growths develop slowly and rarely cause pain. Their outline is usually more clearly defined and they seldom, unless by their size, interfere with the mobility of the tongue. In some of the cases of sarcoma there is a history of the presence of a tumor for many years, but it is to be noticed that shortly previous to consultation the tumor had begun to grow rapidly. A papilloma may appear on the side or tip of the tongue and soon cause the patient to seek relief. A microscopic examination of its point of attachment will reveal its true nature. The sarcomas infiltrate.

Macroglossia is present at birth. The tongue protrudes. Its whole anterior part is enlarged, and it seems edematous though it is often hard. The papillae are hypertrophied. Its rate of growth is slow.

Glandular cysts develop at the tip, along the sides and on the under surface. They may be of slow or rapid growth. They often alternately enlarge and diminish in size. Usually they are grayish and semi-translucent, as their content is most often retained inspissated mucus, which escapes on puncture.

The diagnosis of thyroglossal tumor has been made in a case of sarcoma. The cyst or tumor growing from the remains of a thyroglossal duct is to be found in the median line and in the base of the tongue. It is painless and grows slowly, and until large interferes only slightly with tongue movement. Such tumors are to be removed when found, and at operation the discovery that the tumor is encapsulated will probably lead the surgeon to make a correct diagnosis before mutilation has been done.

Sarcoma of the tongue is not likely to be mistaken for a carcinoma, but if this should occur, the error is not a serious one, as the treatment is the same in either case. In the case of sarcoma a tumor appears which later ulcerates, while in carcinoma the ulcer, as a rule, is first noticed. A painful chronic indurated ulcer appearing at some point of irritation points to carcinoma.

In both we are likely to meet glandular enlargement, but this is more common in carcinoma.

After all clinical manifestations have been duly weighed, a diagnosis should not be made until one has excluded syphilis by both Wassermann test and anti-syphilitic treatment. This causes a delay of from ten days to three weeks, but the benefits over-balance the dangers.

All efforts to make a diagnosis may fail until a section of the tumor is examined under the microscope. Coughlin states that it is necessary to obtain the section from the edge of the growth that one may, if possible, see both sound and diseased tissue in the section.

TREATMENT AND PROGNOSIS: The treatment has been operative in forty-six of the certain cases. In four no operation was done. In two no history is available, the specimens having been found in the museum of the Royal College of Surgeons.

Local removal only has been primarily done in twenty-five cases, two of these with division of the jaw (one patient lived four years without recurrence); three were removed with a V-shaped piece of the tongue (one of these was free from recurrence six years after, one two and one-half years after and one has been lost sight of).

Ten of the local excisions are noted as having recurred. In six others less than two years have elapsed since operation. Only three of the twenty-five patients are known to be well more than two years. Of the others there is no post-operative history.

The more radical operative treatment comprises (a) removal of one-half the tongue and (b) total removal of tongue and some adjacent part or parts.

There were twelve grouped in Class A. Of these one patient had lived fourteen years, one five years, and one three and one-half years without recurrence. Three other patients had lived less than one year without recurrence.

There were eleven cases in which removal of the tongue or more was done. Of these, four patients are free from recurrence after two and one-half, three, four and five years, respectively. One individual was well

one year after operation; one was lost sight of, and in three patients there was recurrence in a year or less.

In the majority of cases, the knife was used for the removal of the growth. In two instances it was followed by the actual cautery. One of these tumors recurred in eight days; the other patient remained well two and one-half years afterward.

The electrocautery was used three times in excising the growth; one patient was well two years later, one well two weeks after and the other died soon after recurrence.

Coley's fluid was used before operation by Foote without apparent benefit. It is still being used in Coughlin's second case. Trypsin and holadin were used in Wiggin's case and with seeming benefit for a while. Polycetannin was also used in the case of Foote, but it seemed to make the condition worse.

The Roentgen ray was used after operation by Fisk, but with what effect we are not told. It, too, is still being used in Coughlin's second case. For the difficult respiration, tracheotomy may become necessary. The palliative treatment must be symptomatic.

In formulating his ideas of the prognosis (1) Coughlin considers only the fifty cases in which the microscopic examination was made.

It may be conceded that left to itself, sarcoma of the tongue is a uniformly fatal disease. The length of time required by the disease to run its course when uninfluenced by treatment will be very difficult to foretell. In one case death occurred about two months after the first appearance of the tumor. Naegele's patient died of pneumonia in a little more than three months. In the other untreated cases recorded the patient was lost sight of or no mention is made of the final outcome.

Fripp and Swan were able to follow twenty-five cases in which operation had been performed. Eleven of the patients had lived without recurrence for from six months to thirteen years. In thirteen there had been recurrence. In three of these the growth "recurred in a short time" and four had remained well more than two years. In one of these four, recurrence appeared after three, and in another three and one-half years after

operation. In nine cases the recurrence was local only, and in one of the regional glands alone, while in four recurrence appeared both *in situ* and in the glands. These thirteen patients died of the recurrence.

Of patients with the round-cell type, only four out of thirteen remained well longer than three years. Of the spindle-cell variety only two out of twelve were free from recurrence after two years. One of these patients had been operated on four and the other eight years previously. In Downie's case—spindle-cell—the patient was well after fourteen years.

One expects the prognosis to be better after a primary operation than after an operation for recurrence, but one finds that this is not necessarily so.

The direct cause of death may be exhaustion, pneumonia, sepsis or hemorrhage.

Recurrence has been noted up to three and a half years after operation.

A fibroma that takes years for its development may show nearly the same microscopic picture as a spindle-cell sarcoma.

Primary Lingual Tuberculosis. W. B. Trimble⁵ states that tuberculous ulcers of the tongue have the following diagnostic points: they usually affect the free border near the tip; the dorsum is generally free; they are as a rule superficial; the base is generally a dirty yellow, dotted here and there with minute whitish specks, which probably represent small areas of caseation necrosis; the ulcer may be oval or gyrate, but the borders are generally sharply defined against the healthy tissues, sloping and not undermined; the lesions are not indurated and the neighboring glands are very slightly affected.

The author further states the histopathologic examination alone is practically useless as a means of diagnosis between syphilis and tuberculosis, but it is of great aid in excluding cancer. The majority of tuberculous ulcers of the tongue are, in all likelihood, secondary; it is easy to prove that an ulcer is secondary, but to prove that it is primary is quite another matter.

(5) New York Med. Jour., March 7, 1914.

Operation for Clefts of the Hard and Soft Palate. L. Emerson's⁶ method of operating for clefts of the hard and soft palate, while not entirely original, is to remove a wedge-shaped piece, base down, subperiosteally from the septum, thus avoiding injury to the nerves and blood-vessels; the space from which this is removed is obliterated by forcing back the premaxilla, leaving a septum smooth on both sides. It is necessary to freshen the edges of the premaxilla, and also the maxilla, in the same way as in the case of a single cleft. If complicated by harelip, Emerson usually repairs the lip during the first few months, and closes the palate some time during the second year. The patient should be liberally fed during the week preceding operation, and should have the rectum and lower bowel well cleared out by enemas just before operation. This permits withholding everything, even water, by mouth, for seventy-two hours following the operation.

Before the introduction of the mouth-gag, a heavy silk suture is passed through the tongue. This is tied tightly across the lower bar of the gag after its introduction and serves to prevent the tongue from falling back into the throat.

The first step is the denudation of the margins of the cleft, and epinephrine is first used for the purpose of reducing the hemorrhage to a minimum.

Instead of denuding deeply and cutting the periosteum from the margins of the bony cleft, thus removing a part of the tissue which should be left to form the flaps, only a thin shaving of the mucous membrane should be removed, but great care should be observed that the margins are denuded through their entire extent.

The next step is a radical departure from Brophy's procedure.

The closer the lateral incisions are made to the teeth the less are the chances of wounding the larger branches of the descending palatine arteries, the broader will be the flaps, and the less likelihood of their blood supply becoming impaired.

The incisions pass through the mucoperiosteum down to the bone.

With a raspatory of moderate curve introduced through these lateral incisions the mucoperiosteum is readily detached from the hard palate until the end of the instrument appears at the margin of the cleft. An instrument whose curve is more nearly a right angle is then introduced in an outward direction, and by their alternate use the mucoperiosteum is completely detached.

The firm connection between the posterior margin of the hard palate and the velum is severed by the introduction of a pair of scissors curved on the flat. When properly severed, the mucoperiosteum and the velum hang loose and are easily approximated to the corresponding flap of the opposite side.

Emerson uses his own needle in stitching. The needle is entered between the flaps into the nasal cavity, rotated to one side and the point pushed through the flap from above downward, the point entering the flap on its upper surface and emerging on the inferior or oral surface.

As soon as the point emerges about 12 inches of the silver wire is extruded from its point.

If difficulty is experienced in forcing the needle through the flap a pair of forceps or, better still, the long curved scissors can be pressed against the oral surface of the flap.

The blades of the scissors are slightly separated at their points and through the separation, the point of the needle emerges. The needle is now withdrawn and the point rotated through 150 degrees in the nasal cavity and passed through the opposite flap in exactly the same manner.

The wire which projects from the end of the needle is folded back on the outer side of the needle in its passage through the second flap and forms an angular loop at the tip of the needle. This loop is increased in size by the extrusion of two or three inches of wire. The wire is then cut off and the needle removed.

Close to the under surface of the second flap is the kink in the wire made by its being folded back. If this

kink is left near the flap, the wire is almost sure to break when it is twisted to tighten the suture. The short end of the wire is next seized and gently pulled out until each projecting end is about 8 inches long. This fine wire pulls through the flaps with perfect ease and no traction or cutting out ensues. The two ends of the wire are grasped by an artery clamp and passed to an assistant. From seven to ten sutures are inserted, passing from before backward.

Before putting in the last two sutures which hold the uvula, two sutures are passed far out from the median line to prevent the tensor palati from pulling and tearing out the stitches in the soft palate and uvula.

In the after-care nothing should be given by mouth for seventy-two hours; conversation should be inhibited as much as possible. Nutritive enemas alternating with large amounts of saline solution passed high into the bowel will maintain the strength and allay thirst.

Buyo Cheek Cancer. G. C. Davis⁷ presents an excellent paper on buyo cheek cancer which may throw some light on the etiology of cancer in general:

The name "buyo," which is commonly used and applied to the "chew" that is indulged in, is not in all cases strictly definite, as the constituents of the combination are generally four in number: the buyo leaves, the betel-nut, slaked lime and tobacco.

The habit of chewing buyo, or "pan" as it is called in India, has been a custom with oriental tropical people for many centuries. It is estimated that one-tenth of all the people on the earth chew this mixture. In the Philippine Islands and Sulu archipelago, the buyo is almost universally chewed by adults and often by children of tender years. It has been estimated that 90 per cent. of the elderly persons in the islands chew buyo.

In reviewing his series of forty-nine cases of cheek cancer, Davis finds a positive history of chewing buyo in forty, or 81 per cent. The length of time these patients had been chewing buyo before the growth appeared varies from three years, the shortest time to

sixty years, the longest, or an average of thirty-five years.

It occurs in women more frequently than in men. Of forty-nine cases, 34, or 70 per cent., were in women. The women chew buyo more than the men.

It is essentially a sickness of advanced years; the youngest patient was 23 years old and the oldest 86. The average age of forty-nine patients is 52 years.

In twenty cases, that is, in every case in which the question was put to the patient, the site of lesion corresponded definitely to the position in which the patient was accustomed to hold the chew. The lime is, Davis believes, the essential or direct cause. However, the chemical properties of the leaves, containing essential oil and the chemical properties of the nut, containing tannic and gallic acids, may be predisposing factors. Sometimes a rather large quantity of lime is used, and the patient states that this causes a "burning" sensation and often irritates the cheek.

Davis believes that the betel-nut may be a predisposing or an accessory mechanical factor.

Davis in his conclusion says:

Cancer of the cheek, so commonly seen in the Philippine Islands, is caused by chewing buyo, and the active agent is the lime.

Buyo cheek cancer is a distinct, definite and separate disease of oriental tropical persons having an entity as definite as the Roentgen-ray epithelioma occurring on the hands of the early Roentgen-ray workers, as the kangri-skin cancer of India, or the skin cancer on arms of paraffin workers and the brand cancer of cattle of the United States and the chimney-sweep's cancer of England.

Histologically, we find the picture of an epithelioma, and the epithelioma may be best classified with the group of epitheliomas known as skin cancer, produced by chronic irritation, which may be actinic, thermal, chemical or mechanical. In the case of buyo cheek cancer it is chemical, the action of the lime.

As this is a very common lesion in the Philippine Islands, and as the surgical treatment is far from satisfactory because the cases are too frequently seen too

late, an educational campaign is advisable to teach the evil results of buyo chewing and to encourage a prophylaxis to be gained by an entire stopping of the buyo habit.

The first symptom the patient notes is an involvement of the inner aspect of the cheek. This is constant and true of all the cheek cases. At first a small elevated growth in the mucosa of the cheek is noted. Early ulceration of the growth is complained of.

The growth of the tumor progresses slowly, takes on a cauliflower-like shape and soon projects from the mucosa into the oral cavity between the two rows of teeth, making mastication painful and often impossible.

PHARYNX.

Relation of Tonsils, Adenoids and Other Throat Conditions to Tuberculous Cervical Adenitis. G. L. Richards⁷ recommends, in all cases of cervical adenitis in which the glands are broken down and an operation on them has to be performed, that the tonsil should be removed at the same time. Richards does not claim that removal of the tonsil removes all source of possible danger of infection of the cervical lymph glands, since anatomic studies have shown that the entire area of the middle ear, Eustachian tube, superior, posterior and lateral pharyngeal wall, the tonsils, base of the tongue, and posterior nares all have their lymphatic drainage into the cervical lymph glands.

The tonsil, however, being large, and situated in the back of the mouth, in which it is very subject to infection and to pressure during the act of eating and swallowing, is probably the greatest offender. As the tonsil is such a possible portal of infection, and as its removal seems to be followed by no deleterious effects on the organism, and as it is very likely to be a source of entrance for the infection of rheumatism, Richards advises its removal in all cases of cervical adenitis, and in all children whose parents give a history of having had cervical adenitis. At the same time, one can not say with positiveness that the removal of the

tonsil will either cure or prevent cervical adenitis. Richards states that it is not probable that all enlarged cervical lymph glands are tuberculous, but presumably about 80 per cent. of them are.

Conservation of the Functions of the Ear, Nose and Throat. W. S. Bryant⁸ pleads that the danger from soot, dust and poisonous gases in every occupation in which they occur should be recognized by law and should be minimized by law. Bryant believes that when the public is sufficiently educated to appreciate the loss through these remediable hardships, it will not be slow in demanding salutary legislation, and in punishing by legal penalty and public opprobrium. The special means of protection in every instance are very obvious.

This subject should be viewed from the metropolitan point of view, considering it from the point of view of the people most affected. Public sentiment should be aroused by an exposition of the dangers and losses from remediable causes, and protective legislation providing general regulations should follow. Public sentiment should be aroused through an appreciation of the value of the functions of the ear, nose, and throat to an active campaign to preserve these functions for the coming generation. Public sentiment should also be moulded to revere as sacred the promptings of the sense organs, and to appreciate the value of the warnings and the great danger which these sense organs point out.

It should be compulsory that children have the necessary attention to their ears, noses, and throats. The importance of keeping dust down is shown by London, which, largely on account of its dust-free foggy air, is the great health city. The legal safeguards we have now are few—only broad municipal ordinances.

The means must now be chosen to approach the end in view, without dangerous speed, but with the evidence of advance. Legislation should compel all large users of coal to destroy or mitigate all acid fumes, volatile poisonous elements, and consume all smoke; thus improving the air for breathing.

Bryant believes that the dust problem does not require legislation so much as the problem of effluvia

does; it can well be regulated by city ordinances and public opinion; the latter should demand a city ordinance providing for sprinkling oil or a hydroscopic fluid in the streets to lay the dust, at all times of the year. Vacuum cleaning should be used in all public buildings, places of business, manufactories, hotels, and apartments.

An Epidemic of Streptococcus Sore Throat. Reported by J. A. Capps and D. J. Davis.⁹ During the past winter there occurred in Jacksonville, Ill., a city of 15,000 people, an unusual number of cases of sore throat, which were traced to the milk of cows affected with streptococcus mastitis.

Drs. Capps and Davis were enabled to study the epidemic from a clinical as well as an etiologic point of view.

The plan of procedure was as follows:

1. A clinical investigation of cases of sore throat and the relation to the milk-supply.
2. Inspection of the cows, dairies and distributing plants.
3. Bacteriologic examinations of throat swabs from infected individuals and of milk from cows showing signs of garget.

The outbreak was quite abrupt in the last days of November, rapidly reaching a climax December 4. After a brief recession there occurred a second prolonged rise in the number of cases that persisted for about two weeks. Thereafter the new cases appeared irregularly.

Altogether, 348 cases of sore throat were reported between Nov. 29, 1913, and Feb. 1, 1914.

The results of the investigation may be summarized as follows:

1. The epidemic of septic sore throat began abruptly, was most active in the first four weeks and gradually subsided after about eight weeks.
2. There were 348 cases of sore throat, most of them complicated by enlargement of the cervical glands and many by a marked exudate. Cultures from a number of throats showed a hemolytic streptococcus.

3. In a canvass of 913 households, in 60 per cent. of the cases of sore throat, milk or cream from Dairy *X* was used, although this dairy supplied only 17.5 per cent. of the households.

4. The morbidity rate in one institution supplied by Dairy *X* was 40 per cent.; in four other institutions supplied by other dairies it averaged 1.7 per cent.

5. Among 1000 customers of Dairy *X*, 215, or 21.5 per cent. developed sore throat, whereas among 6,416 customers of other dairies, 133, or 2.1 per cent., developed the disease.

6. As a result of a systematic inspection of 416 cows on thirty-eight dairy farms, eleven cows with garget were found.

7. Bacteriologic examinations revealed hemolytic streptococci in the milk of two of these diseased cows. The milk of both of these cows was distributed by Dairy *X*.

8. As Dairy *X* did not pasteurize the cream at all and the milk very inadequately, we may conclude that the streptococci originating in the bovine mastitis were probably responsible for the epidemic.

9. A study of these streptococci under varying conditions in the milk shows these characteristics:

(a) They do not appreciably multiply at room or warm temperatures, because of the inhibiting influence of other milk bacteria.

(b) They are soon killed by the acidity of sour milk or buttermilk.

(c) They die out in ordinary butter in a few days, probably because of the acids present.

(d) They live in ice-cream for at least three weeks without appreciable loss of numbers or virulence. Ice-cream, therefore, is a peculiarly favorable medium for the dissemination of the germs.

10. Because of the extensive distribution of ice-cream, manufactured from the Dairy *X* cream, Capps and Davis suspect that ice-cream played an important rôle as a carrier in this epidemic.

Teratoma of the Pharynx. C. C. Eves¹ reports a case of teratoma of the pharynx in a male child 14

(1) Laryngoscope, September, 1914.

months old, apparently well-formed and well-nourished.

When the child was 3 weeks old, following an attack of vomiting, the parents noticed something protruding from the mouth. The father tried to pull it out but found it was fast. The child chewed the growth for a few minutes, then swallowed with difficulty a few times and the growth disappeared. At irregular intervals from a few hours to two weeks, the child had vomited up the growth, chewed at it a few minutes and then swallowed it out of sight. Between the times the growth was seen the child suffered no discomfort swallowing and breathing normally.

Examination: From the usual examination of the child's throat, nothing could be seen in the mouth or throat. Gagging was induced by placing the index finger in the child's throat. After two or three attempts a finger-like growth came up into the throat, doubled on itself until the free end was liberated. Then it shot forward into the mouth, protruding about one-half inch beyond the lips. It was smooth, pinkish in color, and seemed about the size and shape of the child's middle finger. The attachment was by a pedicle to the right side of the posterior wall just behind the upper end of the post-tonsillar pillar. When the gag was removed the child chewed on the growth for a few minutes and with some difficulty swallowed it completely out of sight, the pedicle being entirely hidden behind the posterior pillar of the right side, the main body of the growth was evidently suspended into the child's esophagus. Two days later the growth was excised at the base with curved scissors, without an anesthetic. Very little bleeding occurred.

Laboratory Report: Total length of specimen, 5 cm.; length of the skin covered part, 2.9 cm.; width of the skin covered part, widest 1.1 cm.; width of skin covered part, narrowest, 1.3 mm.; length of the mucous membrane covered part 1.5 cm.; length of the pedicle 6 mm.; width 2 mm.

The skin is perfectly white, soft, and of the texture of the child's neck. It shows downy hair projecting from the follicles at about normal intervals for skin. The mucous membrane is pale pink and very smooth.

There is no evidence of glands in gross examination. Definite line of demarcation like that at the child's lip. Pedicle seems to have large vessel in it.

Microscopic examination: Section shows skin to be thin, normal, fully developed and supported by normal subcutaneous connective tissue. The center of the mass consists of subcutaneous fat.

Diagnosis: Teratoma of the pharynx.

Teratomata are mixed tumors of congenital origin formed from the three germial layers of the embryo.

Chronic Diphtheria Carriers. The occasional persistence of the Klebs-Loeffler bacillus in the throats and noses of patients for weeks and sometimes months after their complete clinical recovery, has been a source of annoyance and concern to everyone who has had to do with diphtheria patients. The necessity for complete isolation of such patients as long as the organisms in virulent form are present, self-evident though it is, entails a serious loss of time and inconvenience to these patients.

A. I. Weil² reports twenty-five cases of chronic diphtheria carriers and gives the results of the use of vaccines in the treatment of these cases.

His conclusions are:

1. Chronic diphtheria carriers do exist.
2. The use of vaccines does have an influence in destroying the bacilli of chronic carriers.
3. The number of bacilli is markedly diminished by the use of vaccines even when the bacilli do not entirely disappear.
4. Diphtheria vaccines, in spite of the toxins they contain, can be used in comparatively large doses, without causing a rise of temperature or other evidence of a general reaction.
5. There seems to be no relation between the amount of local reaction and the efficacy of the treatment.
6. Large doses of the vaccines seem more efficacious than small doses.
7. It is necessary to get a number of consecutive negative cultures before a cure can be said to be effected.

Diphtheria Bacilli-Carriers. Renault and Levy³ made weekly smears from the throats during two months in a school connected with a hospital and in two hospital wards. A total of 784 smears were made, including some from the relatives of forty-four of the children who had recently had diphtheria. The closer neighbors of the diphtheria case nearly always had diphtheria bacilli in their throats. The facts observed led to the adoption of the following rules, and long experience, the authors say, testifies to their being rational and safe:

1. In the family, when a case of diphtheria develops and medical surveillance and hygiene can be counted on, no preventive injection of antitoxin is made, except to infants in arms. When it is doubtful if surveillance and hygiene can be enforced, all the members of the family are given a prophylactic injection.

2. In schools and asylums, medical supervision and strict hygiene are not always attainable, and consequently the children should be closely watched if a case of diphtheria develops. If a second case appears, then every one must be given the preventive injection.

3. In a hospital, as the supervision is perfect, there is no need for preventive antitoxin treatment unless an epidemic threatens. This is rendered probable when two cases of diphtheria develop close together. Very young children and those with measles should always be given a preventive injection even if only one case develops in their ward.

Vincent's Angina. J. J. Richardson⁴ in a comprehensive study of Vincent's angina sums up the subject as follows: Vincent's angina is the local manifestation in the throat and mouth of a disease caused by the fusiform bacillus and the spirillum bearing Vincent's name—probably the same organism in different stages of existence—which may occur in almost any other part of the body and may be membranous, ulcerous, or gangrenous. It frequently occurs after measles, scarlet fever, diphtheria, whooping cough, and numerous other diseases, and as a secondary infection it is serious.

(3) Arch. de Méd. des Enfants, September, 1914.

(4) Ann. Otol., Rhin., and Laryngol., June, 1914.

As a primary infection it is not usually serious. It is more common in malnourished and in children and adult males. As a primary infection, at least it is probably preventable by proper care of the mouth, teeth, and general health. It is much commoner than is generally supposed, and is frequently responsible for throat and oral infections diagnosed as something else. It is contagious, but transmission depends on close contact. It is usually acute, but it may be chronic. Recurrence is not uncommon. The point of attack, as a rule, is the tonsil and the infection commonly remains localized there, but may spread to cover extensive areas. The progress consists of congestion, formation of the membrane, and ulceration. The ulcer extends laterally. The progress in the severer type may be very rapid and tissue destruction very extensive. The disease commonly lasts but a few days. Occasionally, however, it runs into weeks and months. The symptoms are chiefly local, but may also be constitutional. The absence of fever in many cases, and the marked malaise are unaccounted for. The organisms are anaerobic and can only be cultivated anaerobically. Proper diagnosis is dependent on a smear. Differential diagnosis must exclude diphtheria, syphilis, mucous patches, iacunar tonsillitis, carcinoma, membranous croup, etc. Vincent's angina may be complicated with a number of other affections. The treatment is principally local. Trichloracetic acid, chromic acid and salvarsan seem to have the quickest and best results, but many other medications are effective.

Vincent's Angina and Diphtheria. F. Reiche⁵ reports twenty-three cases of the Plaut-Vincent angina, in which diphtheria bacilli were also found in the throat. They did not modify the clinical picture in the least, however. Three of the patients were between 4 and 5 years old, one was 10, the others from 14 to 26 years old. Four had had diphtheria from one to nine years previously. Of the eighteen adults only two had a febrile temperature and one of these was the only one who had no spirilla. The other, a child of 4, developed severe fatal diphtheria of the tonsils after the angina

had cleared up. In two other cases the angina and true diphtheria developed together and both ran a typical course; the patients were both 20 years old and only one recovered. The other developed pneumonia and died four weeks after the first symptoms of trouble. Antitoxin was injected on the fourth day, but did not seem to modify the disease. In two other cases patients with the Vincent angina became infected with diphtheria while in the hospital. These were the only ones who contracted diphtheria out of fifty with the Vincent angina erroneously admitted to the diphtheria ward; they were transferred to another ward as soon as the bacteriologic examination had shown the absence of diphtheria bacilli. The diphtheria ran an exceptionally mild course. The first-mentioned group were evidently diphtheria bacilli-carriers, but there was no suspicion of this until the throat happened to be casually examined for another throat affection. The presence of the diphtheria bacilli did not seem to aggravate it or superpose true diphtheria except in three out of the total twenty-five cases.

Treatment of Acute Pharyngitis. M. I. Knapp⁷ recommends giving first a cathartic, of which calomel is the best. A wet towel wound around the neck, over which comes a dry towel, the two being then left over night, may prove very good. Locally tannin and glycerine, a teaspoonful to a glass of warm water, from 1 to 3 per cent. chlorate of potassium or from 3 to 5 per cent. of alum, should be used as a gargle, as often as the case seems to require, every two or three hours or oftener, if necessary. Internally, according to Knapp, there seems to be no better drug than iron, of which the tincture in doses of from 6 to 15 drops at a dose every three or four hours gives the best results. This drug is given in combination with glycerine and water, well diluted. During the acute stage, the best diet is milk, some bland soup but no beef extracts or beef tea, and soft-boiled, scrambled, or fried eggs, and cool lemonade. Neither solid food nor meat should be given. After the acute stage has subsided, a mixture of hydrochloric acid is to be given in combination with

nux vomica or the tincture of cinchona. Knapp's usual prescription is:

	Gm. or cc.
R—Acidi hydrochlorici.....	15.
Tincturae cinchonae compositae aa.....	15.
Tincturae nucis vomicae.....	6.
Syrupi zingiberis	30.
Aqua ad	200.
M. Sig. One tablespoonful in water at meals.	

If there is high temperature, the patient should remain in bed. This prescription is for an adult.

As to treatment of chronic pharyngitis, immediate attention should be directed to the cause, which Knapp believes lies in the gastro-intestinal tract; this must be thoroughly searched and the proper remedies given. Where hypertrophic conditions exist as a result of the pharyngitis, they will have to be treated surgically. Locally, the same drugs may be used as in the acute cases.

TONSILS.

Tonsillar Infection. G. B. Wood⁹, in his study of the passage of anthrax bacilli through the tonsils, found that the tonsils in the hog are more readily infected by the anthrax bacillus than any other portion of the buccal or pharyngeal mucosa. The clinical history of this disease in the hog shows that in a great majority of idiopathic cases, the pharynx is the site of the invasion, and in all these cases of pharyngeal disease observed by Wood the tonsils were the portal of entrance.

While the culture of anthrax was generally brought into intimate contact with one of the tonsils, it was impossible to limit the bacilli to the tonsillar surface and they must have come in contact with a large part of the pharynx. At the inoculation an effort was made to rub the emulsion into one tonsil only, but in only one case were the lesions limited to only one tonsil, and in this case the tonsil affected was not the one on which the culture had been rubbed.

Wood found that the anthrax bacillus penetrates

through the cryptal and not the surface epithelium and probably always gains access to the parenchyma of the tonsil by passing through the living unaltered cryptal epithelium, and having gained access through the superficial layers of this epithelium it tends to multiply in the deeper layers and then pass into the interfollicular tissue. The anthrax bacillus penetrating through the living normal epithelium causes a devitalization of the tissue which paves the way for a secondary infection from the staphylococci or other pathogenic organisms. The rapidity of the invasion is influenced both by the virulence of the organism used and by the susceptibility of the individual animal. Following the invasion the subsequent course of the disease is similar to that in other tissues.

Chronic Tonsillitis. In an article on "The Recognition of Chronically Infected Faucial Tonsils," G. E. Shambaugh¹ says:

1. When a patient has a systemic infection which owes its origin to foci of infection in the faucial tonsils, the history of attacks of tonsillitis often points more or less clearly to the tonsils as the cause of the trouble.
2. Tonsils, the seat of chronic infection can usually be recognized by a careful examination.
3. Chronic infection in the tonsil can often be detected in cases in which there has been no history of acute tonsillitis.
4. Chronic foci of infection may be present in the depth of the tonsil when neither the history of attacks of acute tonsillitis nor an examination of the tonsil itself discloses any evidence of the trouble.
5. In a patient suffering from chronic systemic infection, the faucial tonsil should always be under suspicion as the most frequent source of the trouble, and in cases in which no other foci can be detected one should not hesitate to consider the removal of the tonsil provided the systemic infection is severe enough to warrant the operation, even in cases in which the history of the patient and the examination of the tonsil disclose no positive evidence of the tonsillar origin of the trouble.

Function of the Tonsil. C. F. Burkhardt² concludes that we have arrived at the reasonable viewpoint that the tonsil is a protective organ just like any other lymph gland. This is only true so long as the tonsil is in a perfectly normal condition. When its condition becomes pathologic, its function is perverted, and in place of being one of the sentinels of protection, it becomes one of the most dangerous portals for the entrance of all kinds of bacteria and their toxines. The removal of the tonsil when its function is impaired is simply the closing of a dangerous portal for the entry of infectious material into the circulation.

Burkhardt divides the indications for the removal of the tonsils into two classes. First, those cases in which the tonsil, by reason of its infected condition, is the cause of diseases by metastasis. Second, those cases in which the tonsil by reason of simple hypertrophy, obstructs breathing, etc., thereby giving rise to certain dangerous results. In this class of cases the tonsil is a receptacle or reservoir for all kinds of infecting bacteria, as a result, perhaps, of repeated attacks of tonsillitis, or peritonsillar abscesses, thus polluting the general circulation through the lymphatics.

Among some of the diseases that can be traced to the tonsil as the origin or portal of infection, Burkhardt gives: rheumatism, kidney infection, endocarditis, pericarditis, myocarditis, streptococcus pleurisy, pneumonia, hepatitis, pancreatitis, gastro-enteritis, appendicitis and pulmonary tuberculosis.

Tonsillotomy Versus Tonsillectomy. T. R. French³ in discussing this subject says:

1. A differential diagnosis should be made to determine, if possible, whether the tonsils are the probable source of infection or are free from disease. The indications of the clinical history and outward appearances of the glands are often sufficient for this purpose.

2. Because of the possible existence of a tonsillar function, also because of the subsequent pharyngeal deformity and the consequent alteration of the quality of the voice occasioned by tonsillectomy, it is desirable

(2) Ill. Med. Jour., November, 1914.
(3) New York Med. Jour., Dec. 5, 1914.

to leave the capsules in the tonsillar fossæ whenever possible.

3. While all extensively diseased tonsils should be enucleated, it is probably safe to say that at least 80 per cent. of enlarged tonsils do not contain foci of infection, and, therefore, do not need to be completely removed; and, indeed, unless obstructive to voice or respiration, do not need to be removed at all.

4. In patients in whom there is a doubt of the character of the interior of the tonsils, but which are brought to operation for the removal of irritating or obstructive adenoid growths, a fairly accurate knowledge of the condition of the cryts or of the presence of pus sacs or pockets can be obtained by removing, at the beginning of the operation, a substantial portion of one tonsil and submitting it at once, in a brilliantly illuminated field, to examination under a finely ground loupe, with a magnification of from five to ten diameters.

5. If the tonsil from which the section is taken is found to be apparently free from disease and the clinical history is without significance, the remainder of the gland should be removed by complete tonsillotomy—that is, down to the capsule. The opposite tonsil, if not obstructive, may then with propriety be left alone, but if obstructive, it also should be removed by complete tonsillotomy. If the exploratory section, however, shows that one tonsil is diseased, then both tonsils should be enucleated. The base left after a considerable part has been removed for examination, can be as readily enucleated as if a part had not been removed.

Post-Operative History of Tonsillectomies. Alfred Lewy⁵ reports twenty-six cases of tonsillectomy two and half years after operation. The reasons for operation and the results are given in detail for each case. Nine patients were improved or cured of the condition for which operation was performed. Four of these were operated on for suppuration of the ears and one for non-suppurative deafness. The improvement in these cases may have been due to the removal of adenoids which was done at the same time. The other condition benefited was frequent sore throat.

(5) Ann. Otol., Rhinol. and Laryngol., September, 1914.

Seventeen patients were apparently not benefited. Three of these have developed a tendency to laryngitis since the operation. Of five patients under the age of six at the time of operation, three are undersized as compared with other members of the same family. None of the patients had arthritis or other definite systemic infections.

Lewy states that the list is too small to warrant any definite conclusions, but suggests that the results obtained did not justify the operation in seventeen out of twenty-six cases, although he believes his indications are conservative. He is inclined to tonsillotomy for simple hypertrophy in children before the second dentition, but tonsillectomy in diseased tonsils or in cases of systemic infection traced to them. He believes that we still have something to learn about the proper selection of cases for operation, and does not think the removal of tonsils is indicated in the absence of direct evidence of their causal relation to the condition for which relief is sought.

Kidney Lesion of Tonsillitic Origin. Pollitzer⁶ recommends testing the urine for chondroitic acid as well as for albumin in case of kidney trouble in the young. The chondroitic acid, he says, seems to be a sign that the kidneys are suffering from the effects of infection. This infection is almost always traceable to the tonsils, and by treatment or by tonsillectomy the source of the trouble can be removed. He called attention recently to the fact that the urine in young persons with orthostatic albuminuria and in certain other conditions in which the urine is clinically free from albumin, becomes intensely turbid when treated with serum albumin in an acetic acid solution. This reaction is due to the presence of chondroitic acid.

Follicular Tonsillitis and Acute Gastric Fever. The frequent occurrence of gastric fever, L. Fischer⁷ says, demands a careful inspection of the tonsils and when these organs show evidence of hypertrophy they should be treated as diseased tissue which may be a focus for future malignant infections. All symptoms pointing to

(6) Med. Klinik, December 21, 1914.

(7) Med. Record, Nov. 21, 1914.

gastric derangement will be present, and still the predominating symptom will be the patches or follicles on the tonsils, causing pain on swallowing. Fischer emphasizes that too much importance can not be placed on the necessity for throat inspection in every child who refuses to eat.

The treatment Fischer advocates is as follows: An alkaline laxative such as a dose of from 3 to 5 grains of compound jalap powder should be given and repeated every three hours until thorough evacuation has been produced. During this eliminative treatment water should be given liberally, but no food. Locally, for the throat tincture of iodine diluted with an equal quantity of water should be applied once with the aid of a cotton swab. After the bowels have been thoroughly cleaned, chicken soup or milk from which the cream has been skimmed or weak tea may be permitted. For the after-treatment one or two drops, depending on the age, of tincture of nux vomica may be given before meals.

Acute Thyroiditis as a Complication of Acute Tonsillitis. C. F. Theisen⁸ reports seven cases of acute thyroiditis and in all except one case the inflammation of the thyroid gland occurred with or directly after attacks of tonsillitis.

Two of these patients had each had two distinct attacks of acute thyroiditis, each time with an acute tonsillitis, and both have since developed well-marked diffuse goiters.

In both of these cases, as well as in all the cases reported in Theisen's paper, the inflammation of the thyroid occurred in a previously healthy gland of normal size.

Suppuration occurs much more frequently in this class of cases, and they are not so uncommon, occurring sometimes with pneumonia, measles, typhoid fever, influenza or diphtheria.

Theisen's patients were all girls and young women and a search of the literature shows that this is true in the majority of the cases. The only case that did not

occur with tonsillitis was one that developed during the course of a pneumonia.

Acute simple thyroiditis which runs its course without suppuration is a rare disease, and primary acute inflammation of the thyroid gland is declared by Ochsner and Thompson to be so rare that it is almost never seen.

Symptoms. The symptoms in cases of acute thyroiditis are characteristic. A symptom, and one causing the patient perhaps the most discomfort, is the dysphagia which is practically always present. This difficulty in swallowing which is largely mechanical due to the compression of the esophagus, is most marked when the swelling of the left lobe of the thyroid is very decided, because the esophagus is closer to the left lobe than to other parts of the thyroid. The dysphagia is sometimes so great that for several days it is difficult for the patient to swallow even liquids. Theisen is, however, of the impression that if some of the cases of acute thyroiditis are carefully studied, it will be found that the dysphagia is partly at least caused by the intense acute angina which often precedes the attack, and will be found more frequently than the reported cases indicate.

Acute thyroiditis is accompanied by a more or less acute congestion and swelling of the mucosa of the upper air passages, and the dyspnea, which is also a frequent symptom, is caused by both the compression of the trachea by the greatly swollen thyroid and the congestion of the tracheal mucous membrane.

A good many of the cases start with a chill, headache, prostration and other symptoms of an acute infectious process. There is always elevation of temperature, but this is rarely either very high or prolonged, except in the cases that go on to suppuration. The swelling of the thyroid varies, but is usually considerable, and there is sometimes considerable congestion of the surrounding parts.

Tonsillectomy During Acute Endocarditis. From a study of the literature and several cases W. G. Harrison⁹ believes the following conclusions justified:

1. Rheumatism or acute rheumatic fever, with its frequent complications of endocarditis, pericarditis, chorea, etc., is often the result of acute cryptal tonsillitis.

2. The milder attacks of tonsillitis with lower temperature and transient sore throat are more apt to be followed by arthritis than are the severe attacks of tonsillitis.

3. It is often wiser to perform tonsillectomy during an attack of endocarditis and remove the source of infection than delay with the hope of operating after the acute attack has subsided.

4. One can sometimes cleanse the tonsil crypts by local applications and syringing with antiseptic solutions, but in spite of the most assiduous care it will sometimes be impossible to find every focus.

5. Cultures should be made from the tonsil in all cases of joint or heart involvement and properly preserved; from these cultures vaccines may be made and the patient properly treated with these in cases in which fever and other signs of infection do not disappear within a reasonable time after the operation.

Peritonsillar Abscess. E. H. Griffin¹⁰ says: "An attack of peritonsillitis generally starts with a distinct chill and is followed by a rise of temperature as high as 103 F. or over. The patient complains of pain in the back, headache, and pain in all the bones; in fact, the initial symptoms suggest an acute attack of articular rheumatism. The throat symptoms quickly follow: swelling of the membrane of the fauces, difficulty in swallowing, pain at the angle of the jaw, and difficulty in opening the mouth. In croupous tonsillitis, follicular tonsillitis and diphtheria the mouth can be opened wide, but in the average attack of quinsy there is always a restriction in opening the mouth due to the inflammation at the angle of the jaw and the beginning of pus at this location."

Griffin advises that the bowels be kept well open during an attack and a nightly dose of 10 grains of quinine given either in pill form, if the patient is able to swallow, or in liquid solution, if the patient can not

take a pill; 10 grains of salicylate of sodium can be given every three hours in plenty of water. Scarifying the inflamed surface with a small bistoury by causing the escape of blood often gives relief before pus has formed. The throat should be examined on each visit with the aid of a strong light. The fingers should be used in each examination to detect the early formation of pus. Time should be taken in this examination and pus should be liberated as early as possible, for the comfort of the patient. The parts can be cocainized by the local application of a 10 to 20 per cent. solution of cocaine rubbed over the surface of the membrane by a piece of cotton fastened to a probe. The operation is painless and the relief is beyond description.

TRACHEA.

Sarcoma of Trachea. J. M. Ingersoll¹ reports a case of primary sarcoma of the trachea in a man of 32, who said that he had had a persistent troublesome cough for several months and during this time had had three very severe prolonged attacks of paroxysmal coughing. In each of these attacks he had finally coughed up and expectorated what he called a "polyp," which were irregular slightly nodular masses. The smallest one was about 1.5 centimeters in diameter, the largest one was 3 centimeters long and 1 centimeter thick, tapering down to a small pedicle at one end.

His larynx was inflamed and on the left side of the trachea, just below the first ring, there was a pedunculated tumor, quite similar in appearance to the largest one which the patient had expectorated. At this time there were no indications of any involvement of the tissue around the larynx and trachea. Microscopic examination of the tumors showed them to be spindle-celled sarcoma.

His physical condition at this time was good but he soon began to have increased difficulty in breathing and rapidly lost weight. One month later he consented to go to the hospital on account of very marked difficulty

(1) *Laryngoscope*, July, 1914.

in breathing and it was necessary to do a low tracheotomy on him the day after he entered the hospital.

Two weeks later he consented to operation. G. W. Crile exposed the larynx and upper part of the trachea and found a broken-down mass of neoplasm extending so widely around the left side of the neck that he decided it was inoperable and the incision was closed.

A little later the man began to have difficulty in swallowing, probably due to involvement of the esophagus, became very much emaciated and died about seven weeks after the operation.

Deferred Death After Tracheotomy for Laryngeal Diphtheria. In laryngeal diphtheria, J. Biernacki² says, it nearly always happens in cases of deferred death that severe lobular pneumonia develops. Death is usually attributed to the pneumonia, but according to Biernacki this view requires qualification. The fact that asphyxia largely due to the plug is likely to anticipate death from the pneumonia *per se* must give weight to measures directed against its formation. Generally those cases in which lobular pneumonia is established at the time of operation are far more liable to tracheal plugging. Biernacki believes that it is safer to place every tracheotomy case in steam for at least a week if the tube is required for that time. Steam hinders desiccation of the discharge and is beneficial when lobular pneumonia threatens or is established.

If obstruction returns after an interval and is not due to loose membrane, and the patient is not coughing up discharge freely, or if the discharge is very tenacious, a spray of sodium bicarbonate is prescribed (10 gr. to the ounce of water). A rather coarse, intermittent spray is used with the nozzle directed into the mouth of the tracheotomy tube. This is done during successive inspirations. The patient will probably then begin to cough and the spraying fluid, mixed with more or less discharge, may be driven up to the inner end of the tube or out of it. To sop up the fluid and discharge a thin swab is made by wrapping cotton wool round the point of sinus forceps bent to the angle of the tube. New swabs are inserted until one comes away

(2) *Lancet*, July 11, 1914.

dry. Then the whole process is repeated three or four times. Not uncommonly the patient in the end coughs up a quantity of partly desiccated discharge, so that the formation of a plug may be delayed or possibly averted. If definite plugging occurs the sodium bicarbonate is increased to 20 gr. to the ounce. Biernacki is of the opinion that extraction should be postponed until it is certain that spraying alone will not dissipate the plug and the obstruction has become immediately dangerous. Great care is needed in inserting the forceps; if they are opened too soon or too wide or force is used the wall of the trachea may be injured. Streaking of the discharge by blood not referable to the operation wound may reveal injury the result of which may be that obstruction returns earlier and proves less amenable to treatment. The forceps should be inserted no farther than is necessary to grip the plug. Extraction is discontinued in improving cases whenever this can be done without undue danger of suffocation. Oxygen when used by Biernacki is always passed through water. It rapidly absorbs moisture and thus dries up discharge.

LARYNX.

Defects of Speech. G. H. Makuen³ believes there are three ways in which the lymphoid tissue of the upper respiratory tract may affect the voice and influence its development: first, through its action as a lubricant to the pharynx; second, through its influence on the action of the muscles employed in phonation; and third, through its effect on the resonance chambers of the voice.

Lymphoid tissue is always present in the upper respiratory tract, and it has important mechanical as well as systemic functions. In its normal condition it is beneficial to the voice, because it tends to lubricate the pharynx, to direct the action of the vocal chords, and to improve the functions of the resonance chambers, but in its abnormal condition it is harmful to the voice, in that it tends to either over or under lubricate the

(3) Laryngoscope, January, 1915.

pharynx, to deflect the action of the vocal muscles, and to impair the functions of the resonance chambers.

Normal lymphoid tissue in the upper respiratory tract should never be removed for any reason whatsoever, and abnormal lymphoid tissue should be treated on strictly medical and surgical principles.

Abnormalities that are deleterious to the general health of the individual are also deleterious to the voice, but operative measures that are beneficial to the general health of the individual may be decidedly injurious to the voice.

From the vocalist's standpoint, therefore, the highest degree of conservatism that is consistent with the principles of good surgery should always be practiced. Makuen claims that an extra-capsular tonsillectomized pharynx is always a more or less damaged pharynx and the operation should only be done when the damage to the pharynx and to the individual threatens to become greater by leaving it undone.

Voice Fatigue in Singers and Speakers. According to J. W. Voorhees⁴ weakness of the voice, or phonasthenia as it is now commonly known, is a disturbance in which a given voluntary impulse to the vocal bands is not followed by a normal tonal effect—that is to say, the produced tone is higher or lower than the intended tone, is unpleasant to the ear, and has no staying or carrying power.

The fundamental cause of this difficulty is in many cases faulty voice placement.

Voice is produced, not by the throat alone as is commonly inferred, but by every part of the body. The nose, accessory sinuses or resonators, pharynx, buccal cavity, teeth, lips, tongue, larynx, lungs, bony thorax, diaphragm, respiratory muscles and, most of all, the central nervous system take part in this complex vocal mechanism.

Certain physical causes associated with diseased conditions engender disturbances which prevent the muscles concerned with voice production from reacting properly to normal impulses. Thus anemia and chlorosis, through insufficient nourishment of the muscles

and improper removal of waste, are not uncommon causes. In such cases, in which voice gymnastics and other therapy fail, arsenic, iron, and strychnine may work a cure.

The edges of the vocal cords are extremely sensitive to light influences. For example, pregnancy, a physiologic condition, may change the quality and carrying power of the voice very markedly. Menstruation also affects some women in like manner. Convalescence from typhoid and influenza frequently shows marked vocal changes which are for the most part, however, merely temporary. Chronic diseases are a fatal cause of voice fatigue; chronic tonsillitis with concrement formation is especially important. Nasal growth and deformities, purulent discharges and chronic hypersecretion are also frequently responsible agencies.

False teaching and improper vocal efforts are common factors.

According to Voorhees the symptoms of phonasthenia are definite and certain. There is sudden and severe hoarseness, huskiness, tendency to clear the throat constantly, pain in the sides of the neck, and pain on swallowing. There is no sign of an active inflammatory process, although the redness due to trauma is pronounced if the condition comes on acutely, as in public speakers. The voice is weak, unsteady, tends to break in certain spots, and to slide off the pitch into a lower key.

The treatment of voice fatigue, both in speakers and singers, is fraught with difficulty, chiefly because the thing mostly to be desired, *viz.*, rest is felt to be impossible.

With singers, Voorhees advises that a system of prophylaxis should be worked out. The teacher must be invited to send his pupils for an early examination not only of the nose and throat, but of the general condition as well. This should be done after the first interview between teacher and pupil before lessons are begun. If in the general examination there are extreme nervousness and irritability, poorly nourished body, chlorosis, anemia or debilitating disease, the pupil should be advised not to undertake so diffi-

cult and prolonged a task as voice culture. If he does, disappointment and even worse are inevitable.

The "feeling," and significance of early voice fatigue should be explained. Lessons should last not longer than twenty minutes, consisting of vocalization for five minutes, followed by a rest for five minutes. The pupil should not go home at the end of the first lesson to strain his voice by attempting arias from grand opera. He must be taught how delicate the vocal mechanism is, and that a long bright career is rather to be desired than a short brilliant one. The physician should realize the utter futility of spraying, painting, burning, the use of pastilles, etc., save when called for in acute infections and chronic productive processes.

Local causes of minor value, growths, etc., should be removed only when analysis shows that they are of great importance.

Large tonsils in singers must be studied before removal is advised. It may be wiser to do a tonsillotomy rather than a tonsillectomy or even to treat the crypts conservatively. Caustic agencies are to be avoided in phonasthenia. Silver nitrate should not be used in the larynx unless there is chronic laryngitis. Warm applications are useful for pains in the throat. Menthol may be applied to the mucous membrane for cooling, analgesic effect.

Voice fatigue in speakers is often due to the fact that the voice is pitched too high, *i. e.*, above its normal range.

The speech must be slow, fairly light, with good lip and tongue action. The voice should be directed forward against the upper teeth and hard palate, and increased and diminished in a monotone. Certain syllabic exercises such as the *no, na, nu, ni, na* and *eo, ro, mo* varieties sung with moderate strength in middle voice are helpful. During these exercises special attention must be paid to the breathing.

Quite marked phonasthenic symptoms may disappear under proper attack, correct breathing, and accurate tone placing. Simple exercises have sufficed to reduce vocal nodules and general cord thickening when these are not too marked or of too long standing.

Elimination of Speech and Voice Defects. Bernard Cadwallader⁵ writes that permanent elimination of speech and voice defects, rests on perfect coördination of speech and voice apparatus, diaphragmatic breathing, and absolute mind control.

The entire speech and voice machinery of the speech defective is in a state of chaos, similar to an engine running wild, lacking the guiding, controlling hand, will and mind of the skillful engineer.

Stuttering and stammering do not come from malformation of the organs, but from a wrong activity of the organs. Whatever mystery there is about stuttering and stammering Cadwallader believes comes from a lack of knowledge of physiology and psychology of speech and also from not knowing just what are the wrong conditions, the wrong positions, and the wrong movements during the activity of the organs concerned. The laryngoscope in use makes normal speech and even normal phonation impossible, so that it is of little use in solving the problems confronting the speech specialist; for speech defects are caused by the interfering action of certain muscles set into activity by wrong speech concept, or by abnormal or subnormal conditions arising from imperfect coördination. It may also be defined as a conflict between the voluntary and involuntary systems.

The way a child learns to talk is the way the speech defective must learn to talk, if he is ever to reach permanent normal speech. The brain centers and the nerve centers must be permitted to do their work uninterfered with by any conscious effort on the part of the speech sufferer.

The first step, then, is to form a right speech concept, to know definitely and clearly the process of speech control.

Cadwallader makes five divisions to his plan of elimination:

First: Training speech muscles through sense of touch at speech points.

Second: The elimination of the monotone through inflection.

Third: Diaphragmatic breath control to eliminate throat clutch.

Fourth: The short phrase to eliminate rapid continuous speech and to prevent the possibility of talking on a breath exhaust.

Fifth: Permanency of new speech habits through reading aloud and conversation.

The author's work of speech reconstruction begins with letters, then words, and afterward phrases.

He gives the pupil each letter of the alphabet to make so that he may observe how the pupil makes them. He finds an overwhelming sympathetic muscular activity. For example: In making the "B" (a labial) which should be made with a delicate touch, or meeting of the lips and the contact broken as quickly as possible, he finds the entire power of jaw, lips, tongue and throat involved in its production.

A classification of the consonant is now presented.

The linguals, L, N, D, T, S, Soft C, made with the tip of the tongue delicately touching the hard palate as near the teeth as possible, with jaw lips and throat in repose.

The labials, M, P, B, W, made with the lips daintily and delicately touching each other, with jaw, tongue and throat in repose.

The gutturals, K, Q, G and hard C, made in throat, with lips, jaw and tongue maintained in absolute non-activity and repose.

The same discipline and training in making the dento-labial, F, and V, dento-lingual, TH, and aspirate is maintained.

From now on, each speech part involved must act independently and without sympathetic action of the other parts.

Hitherto, the speech defective has been in bondage to the consonants. The vowels have been slighted. In the next progressive step of elimination, the study of words, this is reversed. The patient will now slight the consonants and linger or raise on the vowels. Cadwallader calls the word with one syllable the inflected word. The word with two or more syllables the accented word. Over the inflected word, he uses a large V, over the accented word, an inverted (A), and smaller inverted (a) one

to each syllable. This develops smoothness and perfection of syllabic development, mentally and in utterance. This helps wonderfully in establishing deliberation and poise, and rhythmic flow, eliminating the irregular, jerky spasmodic banging together of syllables and words against each other.

Full, deep diaphragmatic breathing is of utmost importance to the speech defective. This must be established to relieve the vocal cords of the imposition of breath control and inevitable throat clutch.

EXERCISE: Stand erect, chest high and active, while taking in breath, expand at the waist with diaphragmatic muscles, hold the latter tightly while counting 20, slowly increase gradually to 40. The full, tight sensation in the throat at first experienced during this exercise will pass away when the diaphragm muscles have become accustomed to their work—leaving the throat free and untrammelled.

The permanency of the new speech habits is established through reading aloud and conversation.

There are several links yet to add before conversation is introduced as the final factor in elimination.

First—Phrase analysis.

Where to raise voice.

Where to rest voice.

Where to breathe.

Second—Reading aloud with markings.

Reading aloud without markings.

Hitherto the principles have been studied separately. The next step is to blend them in actual speech. To go directly into conversation at this stage would not be wise. The pupil has not become familiar enough with his new speech principles to allow mental diversion.

In reading, the thoughts and words are chosen for him, enabling him to focus his entire mental concentration on his markings. Every phrase will be perfect. This will be continued until smoothness, freedom, poise and confidence are established.

Conversation antiphonally will be the beginning of the end.

Hitherto, the vowels have been slighted, the conso-

nants made too prominent and exaggerated unnecessarily and disastrously. This will now be reversed. Raise and linger on the vowels, the consonants daintily touched and left quickly to get to the vowels, the song and melody of the word. "Take care of the consonants and the vowels will take care of themselves." This will prove to be the most interesting work in the entire therapy of elimination.

Make the sense bearing words carry the meaning and the unimportant words no more than they should.

The speech specialist must be a voice specialist, too. He must know the principles and experiences of the use and preservation of the singing voice.

1. Preparation for Inflection.—Sustained tones to be used diatonically—whole steps and semitonically—half steps.

2. Octave Study of the Portamento.—Carrying the voice up and down. Also diatonically and semitonically. If voice range is not equal to the octave easily, use black notes arpeggio c-e-g.

3. For Flexibility.—This exercise should not be used until the muscles are strong enough to resist its strong up-pulling rhythmic character. The vowel "oo" is suggested because of its favoring the desired position of the vocal muscles during tone production.

Guard against breath exhaust.

These exercises are to be taken slowly at first.

The position of the larynx must not be omitted as a factor in speech freedom. Its correct position will add resonance, good tone quality to the voice and prevent crowding the base of the tongue.

Cadwallader has hitherto dealt only with the process of the defective elimination. It is just as important to take into consideration the individuality and personality, the capacity for mental concentration, industry and patience of the stutterer and stammerer. These traits are as varied as the speech defects, and on the skill and tact used in handling them depends the success as largely as on the solution of speech problems.

Nervousness is not a cause of speech and voice defects, but is a by-product of stuttering and stammering.

The speech defective acquires many other defects of

speaking and thinking. He may indistinctly and hurriedly develop a weak and husky voice. He may develop so much timidity or bashfulness that he becomes a saddened recluse or a startling combination of verbosity with awful grimaces. His power of attention and his readiness of thought are frequently seriously affected through multiple thought, word substitution and use of synonyms.

Voice Sign in Chorea. The following conclusions are drawn by W. B. Swift⁷ from a study of twenty cases:

1. These choreic voice changes are more frequent in the vowels, less so in whisper, whistle, consonants, air blow and holding of breath; and are less and less in frequency in this order.

2. There is sufficient uniformity and frequency in the appearance of vocal changes to warrant us in classifying changes of pitch and intensity as one of the signs of chorea; of equal dignity with the knee-jerk of Shaw, the respiratory signs of Graves and other minor symptoms.

3. Other less frequent and less marked changes occur that seem of interest subordinate to those in the vowels.

4. The most marked change occurred in the open prolonged sound of "a" as in "are," and Swift therefore offers this as the routine clinical test and method for the elicitation of the voice sign in chorea.

Deaf-Mutism. E. Fröschels⁸ calls attention in his study of deaf-mutism to the defective respiration which he believes is the result of the lack of speech. He also emphasizes the necessity for training every island or remnant of hearing which a child may possess, repeating the exercises again and again during the day and with different voices. The child should begin early, even at the age of 2, never letting the fourth year pass without commencing training, especially when the trouble is mutism from psychic deafness.

Value of Roentgenography in Diagnosis of Diseases of Larynx and Trachea. S. Iglauer⁹ concludes after a study of roentgenography in the diagnosis of diseases of the larynx and trachea that satisfactory diagnosis can

(7) Amer. Jour. Dis. of Child., October, 1914.

(8) Med. Klinik, Feb. 15, 1914.

(9) Jour. Amer. Med. Ass'n., Nov. 21, 1914.

usually be made by the ordinary method of examination, but observations for the most part are limited to a study of the changes in the lining mucous membrane and give no certain information concerning the changes in its underlying and adjacent structures.

The Roentgen examination gives additional information concerning the pathologic changes in the underlying cartilages, which are more or less involved whenever the laryngeal mucous membrane is the seat of a chronic disease process, such as tuberculosis or syphilis.

In stenosis or distortion of the lumen of the larynx or the trachea, roentgenography usually reveals the seat, the nature and the extent of the lesion. The knowledge thus gained before operative procedures are undertaken on the larynx is of great value. Roentgenography also enables one to study the effects of operation and the position of tubes, etc.

Owing to the ease with which it is carried out, the Roentgen method is of a special value in the examination of children or nervous patients.

Killian Suspension Apparatus. [The editors believe the suspension apparatus is increasing in favor as its use becomes more common.—B.] Lynch of New Orleans has done much to advance and perfect the technique. R. H. Skillern¹ says care must be exercised in introducing the spatula of the Killian suspension apparatus, otherwise the following accidents may occur:

1. The spatula may not be deep enough, thus forcing the base of the tongue backward and obscuring the view to the glottis.
2. The spatula may not be in the median line of the tongue, causing a lateral bulging.
3. The spatula chosen may be too short, so as to prevent the epiglottis holder from properly acting.
4. The clamp on teeth must be fixed and padded, otherwise the incisor teeth may be forced loose.
5. The spatula must not be forced into the mouth as the posterior pharyngeal wall may be lacerated.
6. While the patient is swinging, coughing must be guarded against as the hook may be thrown off the bar.

(1) Jour. Amer. Med. Ass'n., Nov. 28, 1914.

7. The patient in swinging position should have the shoulders resting on the table.

The advantages of its use are: (1) A direct view of the larynx is continually present; (2) the operator is seated in a comfortable position; (3) the field is continuously illuminated; (4) a sufficient amount of working room for both hands is obtained; (5) the upper air-passages can not be flooded with blood; (6) there is no danger of inspiration of blood or pieces of tissue.

The particular indications for its use are: (1) Removal of intralaryngeal growth and hypertrophies; (2) removal of foreign bodies in larynx and mouth of esophagus; (3) currettage of larynx; (4) diagnosis.

Suspension Laryngoscopy in Children. Robert Levy² writes that the difficulties attending the use of the laryngoscope in young children have often been so great that frequently no satisfactory examination could be obtained. These difficulties were increased when an attempt was made to perform any intralaryngeal operation, so that in very young children, especially, it was practically impossible to perform any manipulation *per vias naturales*.

Direct laryngoscopy and tracheoscopy offered a solution to this difficult problem that was enthusiastically adopted by the profession. Levy believes, however, there are many advantages in the suspension method over that of the ordinary direct endoscopy. By the latter method one obtains but a limited view while by suspension the entire field and surrounding parts are clearly before one. In operations both hands are free so that one may with ease perform an operation in this region, keeping the parts free from blood and secretion without difficulty. During suspension, the danger from asphyxia may be said to be *nil* while in the direct method, especially if the trachea is entered, this complication is one which must be reckoned with.

Levy believes that the after-effects of the suspension method of examination are of no more serious moment than those of the most simple laryngeal manipulation, while in the ordinary direct method, annoying swelling and edema have resulted in children.

The technique of this procedure in children differs but slightly from that in adults. It is not necessary to draw the tongue forward nor, in fact, to pay attention to the tongue. It is not necessary that the head hang far over the table; in fact, if a pillow be placed under the shoulders the head may even rest on the table. In many instances, especially when examining or operating in the esophagus, the spatula need not be brought over the epiglottis, but resting well at the base of the tongue it will bring the parts in perfect view. Somewhat more difficulty has been encountered in tracheotomized cases than in non-tracheotomized ones. The secretions and blood flow by gravity away from the field of operation but sponging may be easily carried out and if necessary the parts may be kept clean by gentle suction, using a small electric suction pump. On the whole, Levy found general anesthesia, preferably chloroform, to give the best results. The Junker apparatus and tube add very much to the comfort and facility with which the anesthesia may be continued.

Antitoxin Given Intravenously in Laryngeal Diphtheria. Eight cases are reported by S. Nicholson.³ Irido-platinum needles were used exclusively. A small piece of rubber tubing was fitted to the needle and together they were boiled. The end of the syringe that contained the antitoxin was dipped in tincture of iodine, dried on a piece of sterile gauze and the rubber plug removed. The needle was then connected. The place selected for injection was the median basilic vein, and there usually was no difficulty in administering the serum. In some instances, however, particularly in small infants, occasionally incisions had to be made to expose the vein. At the beginning of this work large doses of antitoxin were administered, as high as 20,000 units at a single dose. Later, 5,000 units was the dose employed and occasionally 10,000 in the very bad cases with results just as encouraging as in cases in which larger doses had been employed. It was Nicholson's custom to use routinely atropine in appropriate doses at proper intervals until the dyspnea disappeared. In very small children, as a

safeguard against auto-extubation and to prevent re-intubation when extubation was resorted to, Dover's powders in doses of from 1 to 3 grains gave satisfactory results.

The result of the treatment was:

First. There was a reduction of mortality from $10\frac{5}{7}$ per cent. to 5 per cent. in all cases of diphtheria, not excluding the deaths that occurred within twenty-four hours. In 1912, the death-rate was $10\frac{5}{7}$ per cent.; antitoxin was then given intramuscularly and hypodermically. In 1913, the death-rate was 5 per cent. plus, including deaths that occurred within a few hours after admission. Total number of cases treated in 1912, 75; 1913, 100.

Second. The period of convalescence was more rapid and vigorous than in those cases in which antitoxin was administered in the muscle or under the skin.

Third. Intravenous antitoxin does not prevent the necessity of intubation unless administered in the early stage of the disease.

Fourth. The small amount of antitoxin necessary.

Fifth. Patients who have received antitoxin previously should not be injected intravenously.

Sixth. The harassing and perplexing feature of extubation is reduced if the intubation is carefully done and without injury to the larynx.

Intubation of Larynx. W. S. Thomson⁵ considers that intubation in laryngeal diphtheria is a better operation than tracheotomy because in the majority of cases it is much more easily performed, no preliminary preparation is needed, no anesthetic is required, skilled assistance is not essential; as there is no cutting, and no subsequent scar the consent of the parents is readily obtained and the operation can be very rapidly performed, even with the patient in bed, and without good light. In the majority of cases it entirely relieves dyspnea; in those cases in which relief is not perfect it may allow a sufficiency of air to enter. If dyspnea is not relieved no harm is done. Tracheotomy can then be performed. The after-care, so important in tracheotomy, is a simple matter.

Active Immunization Against Diphtheria. E. Schreiber⁶ states that he has applied Behring's method of vaccination against diphtheria to more than 700 school children and Kissling to 300 children in the hospital. The intracutaneous seems the best route for the injection. The vaccine is a mixture of toxin and antitoxin, and thus it contains only traces of albumin so that there seems to be no danger of anaphylaxis from its use. No untoward by-effects were noted in any instance except a local reaction to the injection at times. Young children and babies give less of a reaction than older children and adults. The amount of antibodies produced in consequence of the injection seems to parallel the resisting powers and decline as the latter run out. Some respond to the vaccine with remarkable production of antibodies; in a few there seems to be no response. Schreiber says that all evidence to date sustains the assumption that a goodly production of antibodies protects against diphtheria infection. Persons who have much to do with diphtheria, physicians and nurses, gradually become insensibly immunized as their blood is found exceptionally rich in antibodies. As the antibodies develop only in response to actual diphtheritic infection, the physicians and nurses must have acquired repeated mild infections to have developed antibodies to such an extent. The Behring system of two or three vaccinations aims to accomplish the same thing.

Laryngeal Tuberculosis. E. F. Ingals⁷ says: One very suggestive sign that marks the very beginning of a limited number of cases of tuberculosis of the upper air passage is a peculiar thinness, or atrophy, of the laryngeal walls which may appear not more than a third to half as thick as normal. This condition when present and associated with pallor of the mucous membranes is almost pathognomonic. In some cases a diffused, dull congestion, not only of the cords but of the upper part of the larynx coupled with diffuse or local thickening of from 25 to 50 per cent. is one of the signs that appear during the first year. This is attended by sluggish movements of the cords which cause the hoarseness.

(6) Therap. d. Gegenw., March, 1914.
(7) Laryngoscope, January, 1915.

presented tuberculous laryngitis as the earliest and in one instance the only exclusive clinical manifestation of tuberculosis. The patients were 21 and 23, 9 and 11, respectively. In the third family two brothers and the son of one all had pulmonary tuberculosis accompanied by lesions in the larynx so severe that the father and son soon died from inanition owing to the progress of the throat trouble.

Alcohol for Pain in Tuberculous Laryngitis. B. A. Vanderhoof¹ gives his technique for this procedure:

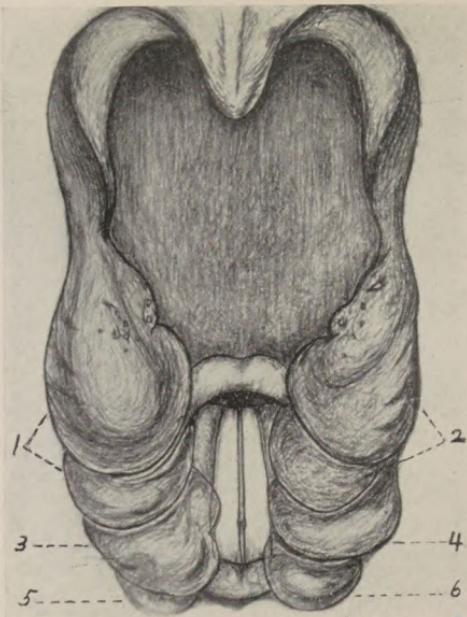
The syringe and needle should be wrapped in sterile gauze and boiled, a 50 per cent. solution of alcohol is placed in a sterile medicine graduate; 2 c.c. of this solution is injected in each nerve.

The patient should be in a recumbent position with the head slightly thrown back, thus putting the muscles of the neck on a stretch.

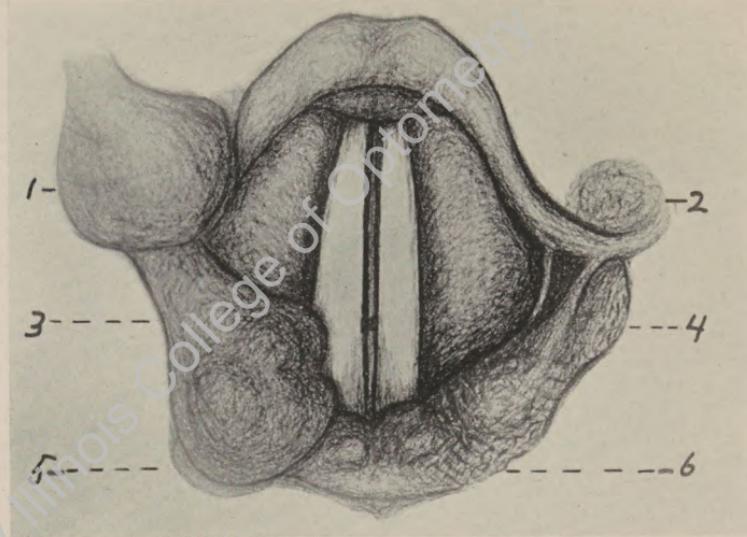
The nerve to be located is situated just above the upper edge of the thyroid cartilage and about one-third the distance from the outer edge, about 3 c.m. from the incisure thyroideæ.

If the finger-nail is pressed at this place and is directly over the nerve, there will be a sensation of pain. The skin should be sterilized with iodine. The skin is picked up between the thumb and fore-finger and the needle inserted with a slow pushing and twisting movement. On account of the dullness of the needle this is the most painful part of the whole operation. After the needle has passed through the skin, slowly push it 1.5 cm. perpendicularly to the skin and move the point slowly around in all directions till the patient complains of a sharp pain in the ear. Sometimes instead of complaining of a pain in the ear he locates it as being in the jaw.

The solution should be injected slowly, about five minutes being used in injecting the whole amount, and while injecting it the point of the needle should be moved about a little in all directions. On withdrawal of the needle it will be found that there is usually hardly a drop of blood at the location of the puncture, due to the fact



a. Infective lymphoid growths, six in number, appearing as if there were eight, two being bilobular; 1, 2, upper pair, bilobular, attached each to the corresponding pharyngolaryngeal fold; 3, 4, middle pair, each to the aryepiglottic fold; 5, 6, lower pair, to the arytenoid.—Casselberry (see page 354).



b. Two days after the first administration of vaccine; the original growth, 3, and the redevelopment, 1, already show reduction; the wrinkled surface near the budding redevelopments, 4 and 5, indicates an inner shrinkage so rapid that the mucosa could not keep pace.—Casselberry (see page 354).

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of using a dull-pointed needle. A little flexible collodion placed over the puncture completes the operation.

Laryngitis Submucosa Subglottica Acuta. This name C. W. Richardson⁵ defines as an acute catarrhal inflammation of the larynx affecting, to a great extent, the submucous layer of the subchordal portion of the laryngeal mucosa.

This affection, manifested most frequently in children, is usually ushered in with the symptoms of an acute laryngeal catarrh, hoarseness, soreness or tightness in the larynx, croupy cough, and stridulous respiration. These symptoms endure for from twenty-four to forty-eight hours, when they begin to partake of a more severe character in that the respiration becomes more stridulous and the breathing more embarrassed. The embarrassed respiration is more marked at night or when the patient is in a supine position. In the more severe cases the breathing becomes markedly embarrassed and attacks of suffocation ensue, the face becoming cyanosed, with delirium and loss of consciousness, which finally deepens into coma and death, unless relief is afforded through intubation, or tracheotomy.

The differentiation of this condition from diphtheria is readily made. The laryngeal diphtheritic patient is usually very ill, has only a very moderate temperature, a slow, soft pulse, is usually pale and quite anxious, and manifests no desire for food. The stridulous breathing is not uniform, being attended with occasional paroxysms of extremely difficult respiration.

In subchordal inflammation the child has not the appearance of being seriously ill, usually has fever, a full, firm-bounding pulse, facial expression good and color not altered; the stridulous breathing is quite uniform, if anything gradually and progressively growing worse, with only occasional paroxysms of difficult breathing.

In laryngeal diphtheria the inspection reveals the presence of a false membrane, and the result of culture examination shows the presence of the Klebs-Loeffler bacillus.

In subchordal inflammation the inspection demon-

strates the presence of the bright red bands immediately below the vocal bands, more or less approaching the middle line. The culture examination is negative.

The prognosis is very favorable for complete recovery.

TREATMENT: The child should be kept in bed in a warm room in which steam is generated. When steam heat is employed, this can readily be accomplished by allowing the valve on the radiator to be slightly opened. The diet should be restricted to liquids and the bowels kept well opened by calomel and salines. Locally the larynx should be touched with a 1 per cent. solution of silver nitrate once a day, if the child be old enough to permit the application being made. An ice bag should be worn over the larynx continuously. Richardson always gives ammonium bromide and carbonate with tincture of aconite internally. If the breathing becomes very stenotic, intubation becomes necessary.

Richardson reports four cases so severe in their character that they necessitated surgical intervention.

Infective Lymphoid Growths of the Laryngo-Pharynx, Secondary to Sinus Suppuration. W. E. Casselberry⁶ says: The particular qualities noted as characterizing infective lymphoid hyperplasia (Plate XIIa) are: a conspicuous enlargement of the smaller clusters and single follicles, an apparently diffused lymphoid infiltration of adjoining tissue, and a decided disposition, in consequence, to redevelopment after excision. In addition to these, recognition of its situation as being in the pathway of a sinus discharge is almost essential to distinction from ordinary follicular hypertrophy.

In the vicinity of the Eustachian orifice, a favorite site for this type, it infiltrates the folds and fills the fossae, baffling efforts at eradication and leading to deafness by obstruction of the tube. In the lateral angles of the pharynx, it forms great pale welts which may rival the tonsils in size and even merge with them by over-riding the posterior pillars. In the tonsillar region, it brings jointly into prominence adjoining groups of follicles, some in front of the tonsil on the plica, others below its lower pole, giving the tonsil an appearance of having

overflowed its bounds. In the tonsil itself, the hyperplasia, if not large, may be obscured by pillar and plica, and unless sinus suppuration be found, an infective tonsillitis may not be distinguishable from that of common retention. Even the suggestive presence of a semi-purulent instead of cheesy substance in the crypts, and oversensitive congested or thickened pillars, are not wholly distinctive. Again, though more rarely, the tonsil is the seat of a large and perniciously active hyperplasia which infiltrates and overlaps the usual bounds, and which, though benign, has an aspect of semi-malignancy.

In the larynx while, as a rule, it produces only moderate thickening, in rare instances the small follicles on the rim of the larynx undergo an immense hyperplasia, developing into tumor-like growths which occupy the space of the laryngo-pharynx, being heretofore of unknown origin, and only vaguely described under the term "lymphoma."

It is this tumor-like formation in the laryngo-pharynx which Casselberry found in two cases, by cultural, microscopic and vaccine methods, to be of microscopic origin.

The *Streptococcus haemolyticus* was present in the tissue in great numbers. All surgical and medicinal treatment being of no avail, autogenous vaccines were tried and both cases yielded promptly (Plate XIIb).

Intrinsic Cancer of the Larynx. St. Clair Thompson⁷ from a study of his cases of intrinsic cancer of the larynx reaches the following conclusions:

1. Cancer of the vocal cords is, in early stages, a very slowly progressive and distinctly limited process. Alteration of voice is the principal and may be the only symptom. Persistent hoarseness in any patient calls for a definite diagnosis.
2. Diagnosis is based chiefly on inspection of the larynx. Only in certain cases in which the growth is a superficial and not an infiltrating one can it be confirmed by microscopic examination.
3. The growth, even when it occupies almost the entire length of a vocal cord, can sometimes be completely removed by endolaryngeal operation in early cases. But

this completeness can be ascertained only when, by laryngo-fissure, the remains of the vocal cord and adjoining soft parts have been removed and submitted to the pathologist.

4. Laryngo-fissure is, therefore, the operation of choice in all cases of endolaryngeal cancer.

5. The operation offers the very best prospects, first, because the disease remains for some time superficial and limited, and secondly, because laryngo-fissure can not be considered a dangerous operation.

6. Statistical results show a lasting cure in 80 per cent. of cases, and if all patients presented themselves and cases were diagnosed early there is no reason why results should not be even more satisfactory.

Results of Operation (Laryngo-Fissure) for Intrinsic Cancer of the Larynx. Surgical treatment of intralaryngeal cancer gives exceedingly good results, especially when compared with those obtainable by surgical treatment of cancer in other internal organs.

On examining this fact we find it to be due to the peculiar manner in which intrinsic cancer of the larynx originates and develops and spreads, as was originally pointed out by Sir Felix Semon.

E. Schmiegelow⁹ presents a table of sixty-six cases of intralaryngeal cancer which have come under his observation :

<i>Table A.—Primary seat of intralaryngeal cancer.</i>	
No specified localization:	18 cases
Vocal cord	36 "
Sinus Morgagni	2 "
Arytenoid region	4 "
Epiglottis	1 "
Ventricular band	5 "
Total	66 cases

In the first eighteen cases the primary seat of the disease could not be localized, as the tumor had extended too far into the larynx when first observed.

The table clearly shows that cancer of the interior of the larynx, in by far the majority of cases, originates as

a growth of one vocal cord, generally in the central part of it, and that it can, therefore, be radically removed. If the disease has extended to the anterior commissure, however, the prognosis becomes more serious, as under these circumstances the thyrotomy cuts through the growth and may possibly be followed by a recurrence.

Those cancers of the larynx which do not primarily attack the vocal cords have, on the contrary, a bad prognosis, firstly, because they very often are not discovered and taken in hand until they have spread so far that there is no possibility of a radical cure by means of a laryngo-fissure; secondly, because these extrachordal cancers are generally of a more soft medullary character, growing quickly and with greater tendency to involvement of the neighboring lymphatic glands.

The only exceptions to this are the pedunculated adenocarcinomas which spring from the aryteno-epiglottic folds.

Schmiegelow operates in the following manner:

The operation is always performed under general anesthesia. He begins with morphine-ether and makes a low tracheotomy. Hahn's tampon cannula is introduced and the narcosis is continued with chloroform. The thyroid cartilage having been divided and the interior of the larynx opened, Schmiegelow fills the pharynx with sterilized gauze introduced from below through the split larynx in order to prevent the saliva from descending and interfering with the scene of action. The larynx is packed with gauze soaked in a 10 per cent. solution of cocaine, to which is added a few drops of a 1 to 1000 solution of adrenaline in order to make the mucous membrane of the larynx anesthetic and bloodless. Then the neoplasm, together with the whole diseased vocal cord, is removed by means of knife and scissors.

All the diseased area having been removed and the bleeding stopped, the thyrotomy wound is closed at once.

The patients are able to swallow on the day of operation, and can leave their bed a few days later.

Thyrotomy could only be performed in thirty-three of Schmiegelow's cases treated up to 1912, as shown in the following table.

Table B.—Results in seventy cases of cancer of larynx.

	Number of cases	Died or re- cured	Died or re- lapsed
No treatment	10	0	9
Tracheotomy	8	0	8
Endolaryngeal removal	5	1	4
Thyrotomy	33	18	15
Subhyoid pharyngotomy	1	0	1
Partial resection of the larynx	4	0	4
Total resection	9	1	8
Total	70	20	50

The result of these thirty-three thyrotomies was that twenty-eight patients survived the operation, while five died from pneumonia, due chiefly to post-operative hemorrhage.

Among the twenty-eight patients, recurrence took place in ten cases, whilst eighteen are alive and well. These eighteen had the carcinoma entirely limited to the vocal cord.

Total Laryngectomy for Cancer. W. M. Mintz¹ has removed the entire larynx on account of malignant disease in twenty-nine cases. Seven of his patients (24 per cent.) lived for more than a year, and three were in good health seven, eight and twelve years after the operation. The two patients who have survived the longest both required a second operation for recurrence in a gland four and twenty months, respectively, after the primary laryngectomy. The ultimate outcome in a number of other cases is not known later than a few months.

Laryngectomy for Tumor. A. Bevacqua² reports two cases in which the entire larynx was removed by Durante's technique. Bevacqua's first patient survived the operation for nearly two years before succumbing to metastasis. The second patient died of pneumonia ten days after the operation. Durante's technique does not guarantee against post-operative pneumonia, but he believes it wards it off better than other methods. The flap starting at the angle of the jaw on each side skirts the anterior margin of the sternocleidomastoid and reaches down to 3 cm. from the upper end of the manubrium.

(1) Russky Vrach., April 12, 1914.

(2) Policlinico, Aug. 9, 1914.

This flap is turned back on a level with the hyoid bone. The cannula is introduced into the trachea after incising the thyrohyoid membrane, and then the larynx is excised from above down to the second ring of the trachea. The flap is then turned back and sutured to the edges of the mucosa of the pharynx and esophagus so that the lower point of the flap rests on the stump of the trachea and is sutured here. Of all the raw surfaces nothing is left exposed but two strips at the side which are packed with gauze. The patient can swallow by the end of the first day.

Intralaryngeal Operations. In writing on the direct method of intralaryngeal operations, C. Jackson³ states:

1. The direct method is the only one by which the larynx in children can be operated on.

2. The indirect or mirror method is applicable only to adults. The reversal of the image sagittally, without reversal laterally, compels the operator to develop the ability to move his forceps backward when the image appears to require the forward direction; and, more difficult still, is the necessity to combine for diagonal movement a reversed anteroposterior with a true lateral movement.

3. The difficulties to be surmounted by the direct method of intralaryngeal operation required prolonged and constant practice, but not nearly to the same extent as required by the mirror method.

4. No anesthetic, general or local, is necessary for operations on the larynx in children. In them, cocaine is dangerous in any case, and general anesthesia is absolutely contra-indicated in all patients with even the slightest degree of laryngeal stenosis. Local anesthesia should be used in adults, general anesthesia, preferably with ether, being required only when cocaine is contra-indicated or when the ischemia accompanying its use causes the growth to shrink to such an extent as to hinder accurate removal.

5. No one method can be said to be best for all cases and all operators. The laryngologist should try all methods and instruments so that he may decide for himself what best suits his personal equation and be prepared

to use the method which, in his hands, is best adapted to the particular case.

Indirect Intralaryngeal Operation. E. H. Curtis⁴ gives an indirect intralaryngeal method for removal of benign neoplasms from the larynx.

Cleanse the throat and larynx with an alkaline spray, and then spray into the larynx a 4 per cent. cocaine muriate solution in small quantity. Touch the uvula, pillars and posterior pharyngeal wall with the same solution with a cotton applicator, and massage these parts with the applicator to accustom the throat to the feel of the instrument. Have the patient hold out the tongue with a napkin, or have an assistant in case the epiglottis is in the way, use an Escat epiglottis lifter. The head of the patient should be steadied by a nurse and the instrument introduced, by daily practice if necessary, until all fear on the part of the patient is overcome. In operating, it is well to educate the patient to use the vowel sound A, changing to E without moving the tongue. The A changing to E brings the cords on the highest plane possible, and gives the best view of them in their fullest extent. Then without dropping the cords and in the E emission, at the command, "Now," the patient should be taught to take a deep breath suddenly without making any sound or body movement, and with complete relaxation. At that instant the forceps are introduced and the growth is seized. This applies to subglottic growths and those on the border of the cords. Growths situated on the upper surface are removed during the E emission. Curtis states that it is surprising how skilful one may become in this procedure, so much so, that having habituated oneself to this method, direct laryngoscopy seems really more difficult.

BRONCHI.

Foreign Bodies in the Bronchi. J. Sallés⁵ has found records of fifty-five cases in which an organic foreign body slipped into the air passages and in nineteen cases the foreign body was a bean; in eight cases a fruit stone;

(4) Jour. Amer. Med. Ass'n., Nov. 28, 1914.

(5) Lyon Medical, July 12, 1914.

in ten a pea or coffee bean. The mortality averaged about 50 per cent. and it is probable that an unsuspected foreign body has been the cause of many more fatalities recorded under other headings. When the organic foreign body is hard, it should be got out without a moment's delay, but temporizing may be justified with a bean or pea cooked soft so long as there are no signs of bronchitis. Metal foreign bodies are tolerated better than the organic, as a rule, and roentgenoscopy locates the metal objects, which is not possible with a bean or similar organic foreign body. Turning the child upside down has little hope of success and Sallés protests vigorously against this dangerous measure unless the foreign body is small, hard and smooth, like a glass bead. With the aid of prompt bronchoscopy the mortality has declined from 50 to 13 per cent. (1909) and Killian reported in 1913 a mortality of only 8.7 per cent.

Bronchial Asthma. It is generally accepted that bronchial asthma is a neurotic affection characterized by hyperemia and turgescence of the mucosa of the small bronchial tubes and a peculiar exudate of mucin. The attack may be due to direct irritation of the bronchial mucosa, or may be induced reflexedly by irritation from other parts of body, such as cardiac, renal, stomach, intestinal, genital, uterine, nose or throat and possibly eye. Cardiac and renal might be classed as mechanical due to edema and stasis, or irritative, due to toxemia. It is the opinion of W. T. Patton⁷ that the most common source of reflex irritation is the nose and throat, reflexly involving the pneumogastric nerves—such conditions as polypoid or suppurative ethmoiditis, deviated septa, enlarged middle turbinates, pressed upon by the septum and outer wall of the nose, hypertrophied inferior turbinates, diseased tonsils, especially the adhesive type, also lingual tonsils.

The tonsils may act in two ways, by reflex irritation and by causing slow toxemia. Patton also believes that should we not be able to find any trouble, or should the treatment of conditions found not improve the asthma, we are justified in passing the bronchoscope and will often find one or more small ulcers or hyperemic spots

in the trachea or bronchial tubes, which should be treated by application of silver, argyrol, glycerite of tannin or whatever seems proper for the condition. Given a case of asthma, the intestinal tract should be carefully studied and treated, then the heart and kidneys should be carefully looked after. If the trouble is not located, the nose and throat should then be carefully examined and any abnormal or diseased condition removed or treated.

The sequence of events that are responsible for an attack of bronchial asthma, according to the view of O. H. Brown,⁸ is as follows:

1. The patient has a bronchitis more or less of a chronic nature.
2. He coughs considerably, in paroxysms at times.
3. The forceful coughing causes a damming back of the blood into and back of the right heart.
4. This increased venous pressure causes an increased pressure in the bronchial vein and in the bronchial capillaries.
5. As the venous pressure increases, the flow of lymph from the thoracic duct and its tributaries will also be more or less hindered.
6. The damming back of the lymph into the lymph spaces of the bronchial mucosa and of the blood into the capillaries of the bronchial vein causes a swelling of the mucosa of the bronchi.
7. In the smaller bronchi this swelling is sufficient to obstruct greatly the passage of air through the bronchi.
8. During inspiration all this damming back of blood and lymph is decreased, and air is allowed to pass through the bronchi more readily than during expiration.
9. As the expiratory effort forcefully dams back the blood and lymph the expiration becomes very difficult.
10. There is thus established a vicious circle, particularly if there is any coughing after the dyspnea develops.
11. Morphine and strychnine relieve the attacks by the bronchial irritation and some of the mental anxiety, virtue of the facts, Brown believes, that morphine relieves while the strychnine probably does its work by its effect on the arterioles, raising the systemic blood-pressure and

(8) Jour. Mo. State Med. Ass'n., January, 1915.

increasing the nourishment to the over-worked right heart.

Asthma in Children. Its Relation to "Egg Poisoning." F. B. Talbot¹⁰ is of opinion that asthma is a manifestation of anaphylaxis, namely, a local manifestation in the lungs. He believes it possible that the urticaria which is seen on the skin may also occur on the mucous membrane of the bronchi, and thus cause the symptoms of asthma. Asthma in a certain number of children is due to egg poisoning. Scarification of the skin and inoculation with egg-white will show whether egg albumin is the specific cause of the asthma. Many, if not all patients with egg asthma may be immunized to egg-white by feeding them with gradually increasing doses of egg albumin in capsules. When the egg idiosyncrasy is cured the asthma stops unless an idiosyncrasy to some other protein complicates the situation. Horse asthma is an anaphylactic phenomenon due to a protein of the horse and may be recognized by scarifying the skin and applying horse-serum. A similar reaction to the egg reaction results.

Acetyl Salicylic Acid in Treatment of Asthma. G. Jepsen¹ has found great relief by using acetyl salicylic acid, as have also a number of his patients. The dose he gives is 1 gm. In some cases no benefit was apparent from it and only epinephrine gave relief. All the patients had a vasomotor rhinitis which suggests that reflex action from the nose may be an important factor in asthma. Jepsen believes that treatment of the rhinitis is an indispensable preliminary to treatment of the asthma.

ESOPHAGUS.

Esophagoscopy. S. A. Friedberg³ reports twenty-three cases of esophagoscopy in which foreign bodies were removed from the esophagus in sixteen, one of which was but partially successful. In two others, the foreign body was secured, but was lost and passed into the stomach. In three cases the symptoms were those of esophageal involvement, while the cause of trouble was

(10) Boston Med. and Surg. Jour., Nov. 5, 1914.

(1) Ugesk. f. Læger, Aug. 20, 1914.

(2) Ann. Otol., Rhinol. and Laryngol., March, 1914.

located in the lower part of the pharynx and removed. In the remaining two cases, no foreign body was present, but in one a peri-esophageal abscess was found. One fatality is noted. In thirteen of the sixteen cases, the age of the patient was under three years, the youngest being eight and one-half months old.

Acute Injury of the Esophagus. J. Grober⁵ warns against any attempt to remove foreign bodies from the esophagus by mechanical means except under direct inspection with endoscopy. Until this can be done the patient's pain and distress can be alleviated by sipping a solution of cocaine, a drop or so at a time, keeping well under the maximal dose, or twenty drops of a 1 per cent. solution of morphine in a tablespoonful of water. The region should be examined with the endoscope also if the slightest disturbance is noted a few days after a foreign body in the esophagus has been expelled by vomiting or has been carried down through the stomach and intestines. Gunshot and bayonet wounds of the esophagus display a marked tendency to spontaneous healing. In one such case, the man died a week later from a wound in the head received at the same time a bullet had severed about a third of the circumference of the esophagus; necropsy showed that the opening in the esophagus had healed without suppuration. The man had been given nothing by mouth except ice water. With cancer of the esophagus, the patient should not be allowed to suspect the nature of the trouble. In management of a diverticulum, Grober claims that relief can often be obtained from an emetic; he mentions one patient who for years has taken an emetic every morning and thus regularly clears out his diverticulum.

THERAPY OF NOSE AND THROAT.

Normal Horse Serum in Nose and Throat Operations. In eight cases reported by Theisen and Fromm⁷ the average coagulation time before injection of the serum was 5.18 minutes, and after injection 4.12 minutes, making an average decrease in coagulation time of 1.06 minutes.

(5) *Deutsch. med. Wochenschr.*, Nov. 26, 1914.

(7) *Albany Med. Ann.*, October, 1914.

Considering the comparative safety in the use of serum, and the great lessening of the danger of postoperative hemorrhage, the authors advise that it should be used whenever an operation must be undertaken in a subject of the hemorrhagic or hemophilic diathesis.

Anaphylactic Reactions Occurring in Horse Asthma and Allied Conditions. J. L. Goodale⁸ reports the results of his investigations of this subject. Although the statement is repeatedly found in the literature that asthmatic individuals may show anaphylactic shock after the administration of antitoxic sera, no systematic observations have been made in regard to determining actually when danger may be anticipated. Such an investigation could not justifiably be carried out by the subcutaneous injection of horse serum, since in the first place alarming symptoms might be occasioned if an excessive dose were administered, and in the second place it is possible that certain individuals might receive the test dose without unusual symptoms, but might thereby be sensitized so that later if diphtheria actually occurred the injection of antitoxin might be followed by anaphylactic shock.

The tests were made by Goodale in the following manner:

1. The lobe of one ear or the skin of the arm was moistened with a drop of diphtheria antitoxin, and a superficial cut was made with a paracentesis needle.

2. A drop of the same antitoxin was placed in one nostril, on the anterior end of the lower turbinate.

In five patients with horse asthma the application of horse serum to an abrasion of the skin produced within a few minutes sharply localized edema and redding. In three of these cases the introduction of horse serum in the nose caused edema of the nasal mucous membrane, together with profuse watery discharge and sneezing.

One case of horse fever without asthma gave a delayed reaction to the nasal test (although this was reported and Goodale does not vouch for it), but was negative for the skin test. A similar case gave a delayed but definite reaction to the skin test, but showed no nasal symptoms. Four of the horse fever cases with-

out asthma were negative for both tests. It is worth noting that in Cases 6 and 10 while the sister, who had horse asthma, reacted markedly to both tests, the brother, whose vasomotor symptoms from horses affected the nose alone, showed no reaction.

Six cases of bronchial asthma and five cases of hay fever were negative for both tests.

Three patients without vasomotor symptoms who had received immunizing doses of antitoxin several months previously showed no reaction to the tests.

The results of these experiments indicate that a localized anaphylactic reaction from horse serum may be occasioned in certain individuals who experience asthmatic disturbances from the neighborhood of horses. The severity of these vasomotor symptoms appear to be a determining factor in the production of the reaction, since patients with nasal symptoms alone do not appear to be sufficiently sensitized to horses to give an immediate positive skin test.

The number of cases thus far tested is too small to justify definite conclusions in regard to the value of these tests in detecting the existence of a state of sensitization to horse serum, but if further studies should confirm them, they should prove to be of assistance to the physician who is in doubt whether in a given case it is safe to administer antitoxin. It is suggested, therefore, that a preliminary skin test with horse serum be made in all patients who have previously received an injection of antitoxin derived from horses, whether tetanus, diphtheria, or plague serum. Furthermore, in all patients, who are about to receive antitoxin for the first time, inquiry should be made as to whether they have ever been disturbed by asthmatic symptoms when in the neighborhood of horses, and if so they should first be tested.

So far as these experiments go, they would indicate that in horse asthma a dangerous anaphylactic shock may occur after the hypodermic administration of horse serum. In horse fever with nasal symptoms alone this danger is less or not at all to be feared, and in other types of asthma and of vasomotor rhinitis it is not present.

Use of Pituitary Extract as a Coagulant in the Surgery of the Nose and Throat. H. Kahn and L. E.

Gordon⁹ give the results of the use of pituitary extract as a coagulant in the surgery of the nose and throat.

Their cases, except three, were in children aged from 4 to 12 years, to whom 12 minims of the drug were given hypodermatically. The coagulability of the blood was reduced from one-third to one-half. In some cases a greater reduction was noted. For instance, in one patient the coagulation time was four minutes before the drug was given, and after its administration, only one minute was required for the clot to form. Another was reduced from three and one-half minutes to forty-five seconds, and still another from two minutes and twenty seconds to thirty seconds, etc.

TECHNIQUE OF ADMINISTRATION: Pituitary extract was administered hypodermatically in the dose of 12 minims to children and 15 minims to adults, not less than fifteen minutes before the intended anesthetic. The coagulation time was taken before and again after the fifteen-minute interval. The blood pressures were taken at the same intervals. The coagulation time was determined in the early cases with the Brodie and Russell coagulometer, and the remainder of the cases by the drop-on-the-slide method.

CONCLUSIONS: 1. The coagulation time of the blood is materially reduced by the hypodermic administration of pituitary extract.

2. The hemorrhage following nasal and throat operations is much reduced, especially operations on the turbinals.

3. The effect on the blood-pressure of children is variable, as follows: Systolic pressure was increased in 55.31 per cent. of the cases, reduced in 36 per cent. and unchanged in 8.5 per cent. Diastolic pressure was increased in 35.5 per cent., and there was no change in 29 per cent. Pulse pressure was increased in 61 per cent. and decreased in 39 per cent. of the cases.

Radium. W. Hill¹ believes radium is worth trying in inoperable cancer in the nose and throat if an adequate amount is available, if the primary growth is accessible and not too extensive, if metastasis is absent, and if the

(9) Jour. Amer. Med. Ass'n., Jan. 23, 1915.

(1) Brit. Med. Jour., Dec. 12, 1914.

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